THE WELL-SPRING OF SCIENCES:

TEACHING

The perfect Work and Practice of ARITHMETICK,

both in Numbers and Fractions.

Set forth

By HUMPHREY BAKER,

Londoner.

And now again Perused, Augmented, and Amended in all the three Parts by the said Authour.

Whereunto are added certain Tables of the agreement of Measures and Weights of divers places in EUROPE the one with the other, as by the TABLE appeareth.

LONDON,

Printed by *R.* & *W. L.* and are to be sold by *Andrew Kemb*, at St. *Margarets* Hil in *Southwark*, and *Edward Brewster* at the Crane in *Pauls* Church-yard. 1655

To the right Worſhipfull the Governours, Aſſiſtants, and the reſt of the Company of *Merchants Adventurers.*

Humphrey Baker *Londoner, wiſheth health with continuall increaſe of commodity by their worthy travaile.*

IF the knowledge of *Arithmetick*, Right Worſhipful, were of ſo ſmall profit in the life of man, or ſo little uſed in our worldly affairs, that it might be well left, or but ſeldom frequented, it were well done by the Profeſſors thereof, to pen very long and eloquent Orations, in ſetting forth the commendation of the ſame. But ſince experience hath taught to be true the old Proverb: *That where good Wine is to ſell, there need no Garland be hanged out:* Me thinketh they do great injury unto *Arithmetick*, that ſeek to bear the commodities thereof ſet forth in a ſhort Epiſtle, and ſurely they overcharge me in laying ſuch a burthen on my back as were too importable for the greateſt Oratour. For the skill hereof is well known, immediatly to have flowed from the wiſdome of God, into the heart of man, whom he hath created the chief Image and inſtrument of his praiſe and glory, revealing himſelfe unto him ſo farre as he judged convenient, whom notwithſtanding he could not conceive to remaine in the moſt ſecret myſtery of Trinity in Unity, were it not by the benefit of moſt divine skill in numbers, which skill as alſo the moſt full and effectuall knowledge of all other things unſpeakable, God uſed in his wonderfull Creation of all the world out of nothing, which he accompliſhed within the compaſſe of certain number of

dayes

dayes, expressing moreover, what he made in every day, and of certaine his creatures how many he made, as appeareth in the Booke of *Genesis*, written by speciall Revelation of the Holy Ghost, wherein the divine Majesty of God could not be knowne unto us without the knowledge of numbers, nor *Moses* have understood what himself had written. And *Salomon* the wisest man that ever was, considering the very depth of all things within his minde, to whom God had given a greater gift of wisdome, than to any man either before or since, doubted not to breake forth in these words, saying, Thou O Lord hast disposed all things in measure, number and weight, for thus it pleased him to judge; who in another place testifieth how that he hath searched deeper into the causes and knowledge of all things, than any other man in the world.

These testimonies (Right Worshipfull) doe manifestly teach us, what we ought to thinke of the cause, and originall of Arithmetick, and partly also how necessary it is in the life of man, that unlesse by nature, we have some feeling and understanding therein, we are no better than Beasts, and in this respect worse, for that we retaine not that whereunto we are as specially born, as naturally they doe, some to running, some to smelling, some to hearing, some to flying, and some to swimming. Take away Arithmetick, wherein differeth the Shepheard from the Sheep, or the Horsekeeper from the Asse? Surely but only in shape and figure, which as the learned affirme, is a very slender cause of differenee. Wherefore not without just cause have the ancient Fathers, and Philosophers singularly extolled the knowledge of Arithmetick diligently training up their youth therein, as in a science most necessary of it selfe, considering the deep devices, the profound practices, and cunning conclusions therein

contained: and alſo that it is the Key & entrance into all other Arts & Learning: as well approved the Noble Philoſopher *Pythagoras*, who cauſed this Inſcription to be written upon his School-door (where he taught Philoſophy) in great Letters NEMO *ARITHMETICÆ* IGNARUS HIC INGREDIATUR: Let none enter here that is ignorant in Arithmetick: Which ſaying, as it is proper and peculiar unto all ſorts of men in the beginning and entrance into all liberall knowledge and Faculties to be enſued and embraced, ſo ſurely above all other it is, next after the Word of God, moſt fit and neceſſary that it ſhould be written upon your School-doors, (Right Worſhipfull) whoſe Trade and Travaile is imployed in the Noble Traffique of Merchandiſe, wherein you have need of continual recourſe up to this excellent Art. The daily exerciſe whereof, hath ſo ſharpened your judgements and ripened your underſtandings, that moſt of you are become ſingular therein, both to deal that way your ſelves, and to judge of other mens doings. And herein I am ſure you are good Witneſſes with me how fooliſh and vain is their opinion, which beſide your moſt commendable affaires, ſuppoſe and affirme that Arithmetick is of ſmall uſe unto any other men, ſeeing that the Laws of ſundry Realms well inſtituted and guided, have deſervedly accompted for Fools, and unfit Members, (to Rule or deale in a Common wealth) all ſuch as wanted the skill of naturall Arithmetick deprived them both of Lands and living: which as it tendeth to no ſmall praiſe and credit of Arithmetick, ſo am I conſtrained for brevity ſake in few words to overpaſſe both that and others which might be ſaid in commendation thereof. Shortly admoniſhing your Worſhips, that whereas in times paſt, as is well knowne I had travailed in a Booke in Engliſh of that Faculty de-

dedicated unto you; being now enforced to run over the ſame, both amending and augmenting it with ſundry Additions: I am ſo bold againe to attempt your Worſhips with the acceptation therof: hoping that as in foretime ye have taken it ſuch as it was, ye wil now alſo daigne to receive it, being in better caſe (I hope) than ever it was, a token of my good will, howbeit a ſimple thing, wherein you may weigh the heart and not the gift, proceeding from ſuch a Fountame, that if better skill and knowledge had been matched to my good meaning, it ſhould have bin done otherwiſe to the better contentation of your worthineſſe. And therefore in the mean ſeaſon, until it pleaſe God to furniſh me in ſuch ſort, I reſt in daily prayer unto him, to maintaine your Felloſhip in happy eſtate, and to bleſſe your purpoſes with lucky ſucceſſe to guide your voyages with wiſhed increaſe, and to ſeaſon your doings with all kinde of vertue, and to preſerve your lives with deſired health to his will and pleaſure.

To

To the Reader.

HAving (gentle Reader) publiſhed in print one Engliſh booke of Arithmetick containing as I ſuppoſe, ſundry profitable documents for ſuch as deſire any knowledge therein, I have been often ſince that time, and of very late alſo, requeſted by ſundry of my Friends, to peruſe the ſame work, and as I ſhould now judge it expedient, to adde ſomething more thereunto, and to amplifie the ſame. Which earneſt and friendly ſuite of theirs, for certain juſt cauſes ſeeming needfull unto me, ſurely I could in no wiſe deny. For when I perceived the importunity of certaine Strangers, not born within this Land, at this preſent, and of late daies, ſo farre proceeding, that they advanced and extolled themſelves in open talke and writings, that they had attained ſuch knowledge and perfection in Arithmetick as no Engliſhman the like. Truly me thought that the ſame report not only tended to the diſpraiſe of our Country-men in generall, but touched eſpecially ſome others and me, that had travailed and written publickly in the ſame faculty. For unto this ſame effect they have of late painted the corners and poſts in every place within this City with their peeviſh Bills, making promiſe and bearing men in hand, that they could teach the ſumme of that Science in brief Method and compendious Rules, ſuch as before their arrivall, have not been taught within this Realm. Whoſe ſayings to be falſe, and writings untrue, if I were thereto required by men of Authority I am well able to prove; and that more is (be it ſpoken without envie, or thirſt of praiſe) even within this ſame Booke, if it may pleaſe thee to make triall, are generall precepts and Rules to be found, ſuch as they can bring forth neither briefer nor better. But this is no rare thing, ſince in other matters of greater importance, their attmpts are too too perilous, and their deeds outragious, well deſerving reſtraint and baniſhment againſt one of whom, verily not of mine own accord, but conſtrainedly, I have been enforced to ſharpen

my

my pen, for that he, as I heare say, continueth in dispraise of our Nation, saying, That we are unskilfull in those Rules that he teacheth, and himselfe exellent in the knowledge of Arithmetick: Wherin if true triall might be indifferent Judge, I doubt not but he would be found to have least skill of a great many: of whom perhaps, if I should write upon report of others, I could say somewhat more, which would (if it were true, and be known) redound unto his utter discredit, which for this cause I omit to doe, lest the crime of arrogancy might be thought to rest within me, which I object against him; howbeit, thus much I dare affirme, that there are divers in this honourable City, who although they advance and extoll not themselves (so malepertly) as these sort of men are accustomed to doe in all that they professe, yet do far surpasse them, as well in the knowledge of numbers as in all other kinde of learning and skilfulnesse. Another cause also there is of this present Edition, as it seemeth to me very just and necessary, for when a certaine well-willer of mine purposing to imploy some time in bettering his knowledge in Arithmetick through the reading of this present Booke, did certifie me, that he in perusing the same had espied so many errors committed in the printing, that he could gather no truth thereby: I was not a little moved thereat, since that by the disordering thereof, neither the worke retained his true meaning, neither could the Learner attain his desired knowledge: and surely no marvaile, for I am credibly informed since it passed out of my hands, it hath been oftentimes printed without the view of a skilfull Corrector unto the great discredit of the Author. These & such like considerations, urging me forward, and not forgetting the fruit, loving Reader, that may grow unto thee hereby: I have taken in hand both to amend and to augment the same, seasoning (as it were afresh) all three parts of the worke with divers Questions and Examples, very

ne-

neceſſary and profitable; having alſo for thy commodity added unto the end of this Booke divers and ſundry Tables of the agreement of Meaſures and Weights of ſundry places reduced to an equality the one to the other. Unto thee therefore my requeſt is, thankfully to accept the ſame, and in good part, wiſhing well to him that travaileth for thy beneſit, not diſdaining it in reſpect of groſneſſe of the ſtile, or rudeneſſe of utterance, ſince that this Science requireth not eloquence of writing, but plainneſſe of teaching, and truth in working of divers Concluſions by numbers only; deſiring thee, if thou be willing to profit hereby, firſt friendly to amend the Faults that have eſcaped in the printing of the ſame, and then to begin at the entrance of the Book, & ſo orderly proceeding forward unto the end, not turning unto the midſt or laſt part thereof untill thou perceiveſt well that which went before, and ſo doing, thou ſhalt not attaine to the perfect knowledge of the whole effect, but be able alſo by thine owne labour and induſtry to underſtand all other Books of Arithmetick, whatſoever: and thus I bid thee farewell heartily.

THE

THE DEFINITION OF Number.

NUMBER, is as much to say, as a multitude, composed of many unities, as two is composed of two unities, three is composed of three unities, foure of foure unities, five of five unities, ten of ten, fourteene of fourteene, fifteen of fifteene, twenty of twenty, unities, &c.

And therefore an unity is no number, but the beginning and original of number as if you doe multiply or divide an unity by it selfe, it is resolved into it selfe without any increase: but it is in number otherwise; for there can bee no number how great soever it be; but that it may continually be increased, by adding evermore one unity unto the same.

Chap. I.

Numeration.

NUMERATION is the art wherby to expresse & declare the value of any Sum proposed: and is of two kinds: the one gathereth the value of a Sum proposed, and the other expresseth any sum conceived by due figures and places, for the value is one thing, and the figures are another thing: and that cometh partly by the diversity of figures, but chiefly of the places wherin they be orderly set. And therefore you must first marke, that there are but ten figures or characters w̄ are used in Arithmeticke, whereof nine of them are called signifying figures, and the tenth is called a Cipher, which is made like an o, and of it selfe signifieth nothing, but if it be joyned with any of the other figures it increaseth their value, and these be they.

1	2	3	4	5	6
one	two	three	four	five	six,
7	8	9	0		
seven	eight	nine	a Cipher.		

Also you shall understand that every one of

of these figures hath two values: One is alway certaine and hath his signification of his owne forme, and the other is uncertaine which he taketh of his place.

A place is called a seat or roome that a figure standeth in, and how many figures soever are written in one Sum, so many places hath the value thereof: and that is called the first place (which is next toward the right hand) of any Sum, and so reckoning by order towards the left hand, so that that place is last, which is next the left hand. And contrarywise, when you expresse the value of the figures in any Sum, you must begin at the left hand, and so reckon towards the right hand.

Every of these nine figures (which are called signifying figures) hath his owne simple value when he is found alone, or in the first place of any Sum, In the second place toward the left hand, he betokeneth his owne value ten times: as 70. is seven times ten, that is to say, seventy, 80. is 8 times 10. that is to say, eighty. In the third place every figure betokeneth his owne value a hundred times: as 700. in that third place betokeneth an hundred times 7, that

is to say, 7 hundred. In the fourth place every figure betokeneth his owne value a thousand times: as 7000, is seven thousand, and 8000, is eight thousand, these foure first places must be had perfectly in mind, yea and that by heart as they say, for by the knowledg of them you may expresse all kind of numbers how great so ever they bee.

In the fift place, every figure betokeneth his owne value ten thousand times: as 70000, is ten times seven thousand, that is to say, seventy thousand. In the first place, every figure standeth for his owne value, a hundred M. times: as 7000000, is seven hundred thousand. The Seventh place, M, M, times, or a Million: as 7000000, is seven M, M, or seven millions and the eight place ten M, M, times, or ten millions: so that every place toward the left hand, exceedeth the former ten times. But now for the easie reading, & ready expressing orderly of any sum proposed, you shall practice this manner following: as for example, I propose this number 76543265 8, In the which are IX. places, In the first place is 8, and betokeneth but

eight,

eight, that is to say, once his owne raine: and the second place is 5. and betokeneth ten times five that is fifty: in the third place is 6 & betokeneth an hundred times six, that is 6 C. In the fourth place is 2, and that is two M. and 3, in the 5 place, is ten M times 3, that is 30 M. So 4 in the first place is C thousand times 4. that is foure C. M, then 5, in the seventh place is a M, M, times 5 that is five M, M, or rather 5 Millions: and 6, in the eighth place is 6 times ten Millions, that is, Lx. millions, and last of all 7 in the ix. place is vii, C millions now followeth the practice. First, put a prick over the fourth figure, & so over the tenth, and also over the 13, 16, or 19, if you have so many, and so still leaving two figures betweene every prick, and these romes from one prick to another, are called Ternaries; then you must pronounce every three figures from one prick to another, as though they were written alone from the rest: and at the end of their value as so manytimes a thousand as your number hath pricks (that is to say) if there be but 1 prick, it is but 1 M: if 2 pricks, 1 M, M, or else a million: if 3

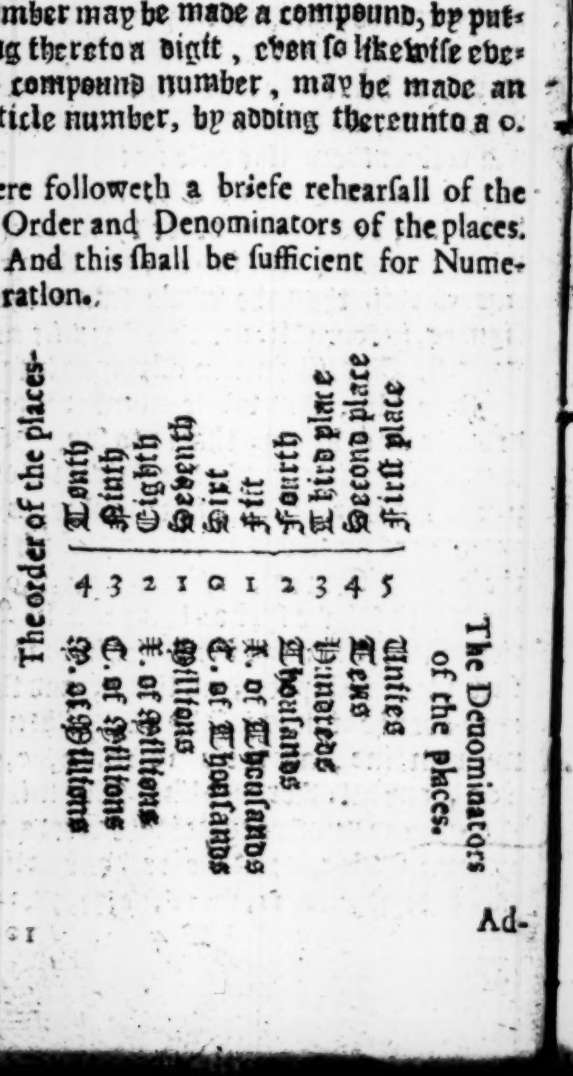
pricks one M, M, M, or a M. millions; and so consequently of all other figures following: then come likewise to the next 3 figures, & found them as if they were apart from the rest, and adde to their value so many times thousands, as there are pricks betweene them and the first place of your whole number; and so doe by the next 3 figures following, and all the rest likewise as in example, 4 5 1 2 3 4 6 7 8 5 6 7 The first prick is over 8. in the fourth place, which is the place of a M. The second prick is over 4, in the seventh place, which is the place of a M, M, or one million: the third prick is over the 10 place, which is the place of a M, M, M, or of a M, millions, as in the former example. Then for the expressing of this number by the value of every figure, according to the place wherein they stand, you shall first begin at the last prick over 1 and take it, and the other two figures 5, and 4, which are behinde the said 1 towards your left hand, and value them alone, and they are foure Cli. M, M, M, or else CCCCli, M, millions: then take the other three Figures from 1, to the next prick toward your right hand

hand, and value, them as if they were a part from the other, and they are 234, which doe signifie CCrrriiij millions, or 234 M M. Then come to the third prick over 8, and take the other two figures behinde it, & reckon them likewise as if they were alone, and they are fix Clrrviii M. And last of all, come to the other three figures which remaine, that is 567, and they are five Clrvij. thus the whole sum of these figures, is four Cli. m, two Crrriij millions, fix Clrrviij. m, five Clrvij, as before.

Note also, that whole number is divided into three kinds, that is to say, Digit number, Article number, & Mixt or Compound number. The Digit number, is all manner of numbers under ten, which are these nine figures, 1,2,3,4,5,6,7,8,9 of the which I have spoken before. The Article number is any kind which hath in the first place a Cipher, as this o, and they may ever be divided just by 10, without any remaine, as these 10,20,30,40,50, 100, and all other such like. The mixt or Compound number containeth divers and many Articles, or at the least one article, and a digit, as 11,12,16,19,22,38,108,

1097, and so forth. And as any article number may be made a compound, by putting thereto a digit, even so likewise every compound number, may be made an article number, by adding thereunto a 0.

Here followeth a briefe rehearsall of the Order and Denominators of the places. And this shall be sufficient for Numeration.



Ad-

Caap. 2.

Addition in whole Numbers.

Ddition, is as much as to bring together 2 sums or more into one, as if there were due to any man 223 l. by some one body: and 334. l. by another, and 431, by another: & you would know how many pounds are due to the same man in all, these three sums shall you set downe orderly the one under the other, writing the greatest sum highest and the next to the greatest under it and the least sum under the last, in such sort that the first figure of the one sum towards your right hand, be directly under the first figure of the other, and the second under the second, and so forth in order.

When you have thus done draw under them a streight line, and then they will stand thus:

431	
334	
222	

Now begin alwayes at the first places toward your right hand, and put together the three first figures of the first places of those three summes, and

take

look what cometh of them, and write that under them beneath the line, as in saying 3, 4, and 1, being put together do make 8: write 8 under 3, as here you see.

And then goe to the second places of figures, and do likewise: as in saying, 2, 3, and 3, make 8, write 8 under 2, as here you see.

431
334
223
8
431
334
223
88

And doe likewise with the figures that be in the third place, in saying 2, 3, and 4, are 9, put nine under them, & so will your whole sum appeare thus: whereby you may perceive that those three sums being added together, doe make 988 l. And this is the art of Addition, according to his simplicity, when the sum of any place doth not exceed a digit number. But in case the Sum of any one place cannot bee expressed by one figure, but two, you shall put the first of those figures under the line, and keepe the other in your minde, for to adde it unto the first figure of

431
334
223
988

of the next place. And if the same next place cannot be adalued but by 2 figures, you must in like manner put the first of those figures under the line, and reserve the second for the other place next after, and thus must you doe from one place to another, untill you have come to the last place, where if it happen you do finde that the sum be of two figures, you must set them both downe, because it is the end of that worke, as in this example.

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 734682456
 450932345
  13467891
   4672123
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1203754815
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Where the first figures are, 3, 1, 5, 6, which added together make 15, and for that 15 is of two figures, I do put the first figure 5 under the line, and keeps the second figure (which is 1) in my minde, the which I must adde with the next figures of the second place, that is to say, with 2, 9, 4, and 5, the which together make 21, I write 1 under the line for the second figure

gure of that addition, that is to say, after 5: and I kæpe two to be added unto the third place the which with the other figures, 1,8,3, and 4, do make 18, therefore I put 8 next after 1, in the third place under the line, & kæpe 1 to be added unto the figures of the fourth place, which is with 2,7,3,2, the which with the 1 that I kæpe, doe make 14: I set downe 4 for the fourth figure (under the line) that is to say, behind 8: and I kæpe 1, to bee added unto the figures of the fift place, the which is 7,6,3, and 8, with the 1 that I kæpe, maketh 25: I put 5 of the fift place under the line next after 4: and I kæpe 2, in my minde to bee added with the figures of the first place that is with 6, 4, 9, and 6, and that 2 which I kæpe, maketh 27: I write down 7 under the line in the first place, & I kæpe 2, which I add with the figures in the seventh place and they make 13: I put downe 3, under the line in the seventh place: and adde 1, unto the figure in the eight place, & they are 10: I doe put 0 under the line in the eight place, and then I adde 1 unto the ninth place that is to say, with 4 and 7 and they make 12: the 12 I write at length

under

under the line, because it is the end of this addition and this is to be done of all such like. And for the easier understanding of that which wee have spoken of addition, you may examine these two other examples following, in the which the first hath these numbers 3570, 2763, 579, and 28: which being added together, doe make this unmber 6940, and in the second example, doth result this number 51683, by adding together of these numbers 47630, 3756, 272. 25, as here under written.

The numbers to bee added.	3570	47630
	2763	3756
	579	272
The line put betweene.	28	25
The summe of this Addition.	6940	51683

Addition of l. s. d.

But if I have any sums which are composed of divers kinds of denominations,

as

as 25 l. 17 s. 4 d. and 14 l. 13. s. 8. d. and 16. l. 19. s. 7. d. to be added together. I muſt firſt ſet downe all the ſaid ſums the one under the other, as heere you ſee: placing the title of pounds, right under the pounds, the ſhillings under the ſhillings, and the pentes under the pentes, keeping likewiſe the due order of their places, in eache denomination; and then I begin at the leaſt denomination which are pentes: and I ſay thus, 4, and 8 makes 12, and 7 make 19 d. that is 1 s. & 7 d. I ſet downe 7 under the line againſt the place of pentes, and I do keepe in my minde 1 s. to be added unto the place of ſhillings: this done, I proceed to the ſaid place of ſhillings ſaying, 1 s. that I keepe and 7 s. are 8. and 3 are 11. and 9 doe make 20: I put 0 under the line againſt 9. and do keepe 2 in my minde: comming then unto the tens of ſhillings, I ſay 2 that I keepe, and 1 make 3, and 1 make 4, and 1 make 5; which are 5 tens of ſhillings, that is to ſay, 21, and 1 ten over, the which I put behinde the 0 towards my left hand under the tens of ſhillings,

li	s	d
25	17	4
14	13	8
16	19	7
57	10	7

lings and I doe kæpe two l. in my minde, then I come to the place of pounds, and say 2 l. that I kæpe, and 5 are 7, and 4 are 11, and 6 doe make 17 l. I do set 7 l. under the line against 6, and do kæpe 1 in my minde, then coming unto the ten of pounds, I say 1 that I kæpe, and 2, are 3, and 1 are 4 and 1 doe make 5: the which I write downe under the line behind the 7: and so is this addition ended and then the said thræ sums being added together, doe amount to 57 l. 10 s. 7 d. and thus is to be done of all other sums of any other denominations.

Other Examples.

225	12	6	5678	13	09
47	3	9	608	00	10
38	18	7	400	17	11
15	00	8	56	18	08
			9	12	07
316	15	6	6754	03	09

of

Chap. 3.

Of Substraction in whole Numbers.

Substraction, teacheth how you shall substract one lesser number from a greater, and sheweth what there doth remain after that you shall have substracted the same; I speak not of the substracting of one equall number, from another equall unto it, for the facility thereof requireth no Rule.

In Substraction are found three numbers: the one is the number from which the Substraction is made. The second is the number that is to be substracted; and the third is the number which remaineth after the substraction is ended. As when I would substract 25 from 40. The said 40 is the number from which the substraction is made, and 25 is the number to be substracted, and 15 is the number which remaineth after you have ended the substraction: here followeth the practice. You shall

ſhall put the leſſer number under the greater in ſuch ſort that every Figure of the one number, may anſwer unto every Figure of the other, orderly according to their places, and then draw a right line under thoſe two numbers as you did in Addition. Then muſt you begin at the right hand, and take the firſt Figure of the undermoſt number, and ſubſtract that from the firſt figure of the uppermoſt number over it, and that which remaineth you muſt ſet underneath the line, right under the figure which you have ſubſtracted: then afterward take likewiſe the ſecond figure of the nethermoſt number, and abate that alſo from the ſecond figure of the higher number: the third from the third, and ſo forth of all the reſt till you come to the end, putting always the remainer of every figure under the line in his due order and place, as by example: I will ſubſtract 2345, from 9876, after that I have ſet them down according to the manner aforeſaid. Then beginning at the firſt place next to my right hand, I take firſt 5 from 6 and there reſteth 1: the which 1 I ſet under the line

9876
2345
7531

right against 5. Secondly, I substract 4, from 7, and there resteth 3: the said 3 I set in the second place under the line next after 1. Thirdly, I substract 3 from 8 and there resteth 5, the which 5 I put under the line in the third place next after 3. Finally, I do substract 2, from 9, and there resteth 7, the which 7 I put under the line in the fourth and last place next after 5, and thus is this Substraction ended, and there remaineth 7531.

But when two figures of one likenesse doe chance to meet, so that the one must be substracted from the other as if I should substract 7 from 7 there would remaine nothing: then must I set a Cipher under the line. But when the figure which is to be substracted doth exceed the figure which is over him, so that it cannot be taken out of the same figure; then must you substract the undermost figure from 10. and that which doth remaine you shall adde unto the same figure which is uppermost. And the summe which resulteth of them both, you shall set under the line. But whensoever you do borrow any such 10 of the ober number, you must ad 1 to the next nethermost figure following which is yet to be substracted. And there is nothing else

to be done in substraction. Example, I will substract 93576. from 4037479: after that I have placed my two numbers as I ought to do, I first substract 6, from 9, and there resteth 3, then I put the 3 under the line right under the 6. And secondly, I substract 7 from 7, and there resteth nothing: I do therefore put a cipher o under the line against 7 in the second place. Then I come to the third place where I find 5 which I cannot substract from the figure over him, which is but 4, therefore I do substract it from 10 as before I taught, and there resteth 5, the which I do adde with the 4, which is over him, and that maketh 9: I put 9 in the third place under the line for the third figure. Fourthly, for the 10 which I borrowed I adde 1 unto the next figure which is to be substracted, which is 3, and they make 4: the said 4 I doe substract from the over figure 7, and there resteth 3, I put 3 under the line for the fourth figure. And then I come to the fift place where I do finde 9, which I cannot substract from the figure over him, which is but 3, but I do substract 9 from 10, and there resteth 1,

4037479
93576
9343903

the which figure 1 I do adde with 3, and they make 4: I put 4 under the line for the firſt figure, and here is to be noted that if it were not for that I did at the laſt borrow 10, the ſubſtraction ſhould have been ended. But for becauſe that I muſt (for every ſuch 10 that I borrow) always adde 1 unto the next lower figure following, I muſt therefore proceed unto the ſubſtraction: and for becauſe that there is no other figure following in the lower number, it ſhall ſuffice to have kept the unity, to ſubſtract it from the next over figure, but I find there 0, and therefore I cannot ſubſtract 1 from 0, therefore I ſubſtract it from 10, and there reſteth 9, which I doe put under the line in the firſt place: finally, for the ten which I borrowed, I kéep 1 in minde: the which I doe abate from 4, and there remaineth 3, the which 3 I doe put under the line in the ſeventh place after 9, and the operation is thus ended.

Another example;

576084025
485675437

90408589.

But if there were many numbers to be

be substracted from one number alone; then must you first adde these numbers together according to the instruction of the Chapter going before, and afterward to make your substraction as above is said. As if I would substract these three sums 123,234,456, from 98925, first, I doe adde the three sums in one, & they are 813. The which I doe substract from 98925, and there resteth 98112.

But if the sums be composed of divers kinds of denominations, then you must begin at the least denomination next toward your right hand, and so substract every denomination from his like, if it may be substracted: if it cannot be substracted, then you must borrow 1 of the next denominatiō toward your left hand & reduce the same into the like denomination of that figure which is to be substracted, then shall you substract your first or least denomination from the said sum so borrowed, and that figure or number that shall remain, you must adde with the uppermost number of the least denomination, set the agregate under the line right against his like. Then the 1 which you did borrow must be added with

the next figure of the next denomination that is to be substracted, and so to proceed with the whole summe that is to be substracted. Example.

I would substract 15 li 17 s 11 d. from 28 li 13 s 9 d. I doe first put down the greater Sum, & under that the lesser, with a line under them, as here you see, and then I doe begin at the least denomination which are penies, where I say 11 penies from 9 penies, I cannot. And therefore I do borrow 1 s. of the next denomination that is of the 13 s. the which 1 s. is in 12 penies: Then I substract 11 penies from 12 penies, and there remaineth 1 peny, the which 1 peny I do adde with 9 penies, and they make 10 penies: the said 10 I set under the line, and do keep the 1 s. in my minde that I borrowed; then come I to the second denomination of shillings, where I do finde 17 s. then I say 1 s. that I borrowed and 17 do make 18 s. the said 18 s. out of 13 s. cannot be, therefore I borrow 1 li. of the next denominatton, that is to say, out of the 28 li. and the said 1 li.

li	s	d
28	13	9
15	17	11
12	15	10

are

are 20 s. then I substract 18 s. from 20 s. & there remaineth 2 s. with the which I do adde to the 13 s. and they do make 15. the same 15 s. I set under the line, and to keep 1 li. to be added to the lower place of pounds: then I say 1 li. that I keep, and 5 are 6: I substract 6 li. from 8 li. and there remaines 2. I set the said 2 under the line against 5: and last of all, I come to the tens of pounds where I doe finde one, then I do substract that 1 from 2, and there remaineth one, which I set under the line, and so I finde there remaineth 12 li. 15 s. 10 d. and so is it to be done of all other like.

Chap. 4.
Of Multiplication.

In Multiplication there are iij numbers to be noted, that is to say, the number which is to be multiplied, the which we will call the Multiplicand: the second is the number by the which

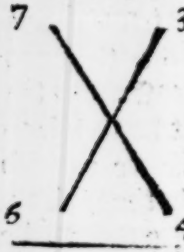
which we do multiply which we will name the multiplyer, or multiplycator: & the third number is that which cometh of the multiplycation of the one by the other, which is called the product. As when I would know how much amounteth 10 multiplyed by 9, viz. How much are ten times 9, I find that they are worth 90, then ten is the multiplicand, 9 is the multiplyer, & 90 is called the product. So that to multiply is none other thing, but to find a nũber which containeth the multiplicand so many times, as the multiplyer containeth unities: As 10 multiplied by 9 do make 90 as before is said. And 90 containeth 10 so many times, as 9 containeth unities, that is to say, 9 times. In Multiplication, it forceth not much which of the two numbers be the multiplicand, nor wh be the multiplier. For 10 multiplied by 9, maketh as many, as 9 multiplyed by 10, yet nevertheless it shall be more commodious that the lesser number bealwaies the multiplyer. And for that, that the multiplication of figures the one by the other, is the chiefe & necessariest kind whereby to know how to work in the multiplication of compound numbers, and that every man hath

hath not the same at their fingers end, I wil therfore give you here certain easie waies of multiplication of digit numbers. When you would multiply two simple figures, or digits the one by the other, subtract each of those digit numbers from 10. Then multiply the two remains the one by the other, and if the sum do exceed 10, write only the first figure, and kéep the other to be added to the next operation, which is thus as followeth: Adde your 2 simple figures together, & of that which resulteth of the additiō, take only the 1 figure, unto the which you must adde the unity which you did kéep before. And that shall be the second figure of the sum which you do sēk eram: I would multiply 7 by 6, I take 7 from 10 & there resteth 3: likewise I subtract 6 from 10, and there resteth 4, thē I say thus 3 times 4 make 12: I write 2 for my first figure, & kéep 1 in mind: then I adde 6 with 7, and they are 13: of the which I cast away the second figure toward my left hand which is 12, & I take only the first figure 3 which is toward my right hand, unto the which I adde the unity which I kept, & they make 4, which I write in the second place after 2, & thus I find 42 which is the value of 7. multiplyed by 6.

D.

Otherwise, and all commeth to one effect: set down your two digit numbers the one right over the other. and right against every of them towards the right hand write his owne difference from 10. Then multiply the two differences together, the figure which commeth thereof, shall you set down under both the differences, if it be a digit number, that is to say, any number under 10. But if there be 2 figures, set down but the first, and kéep the other in your mind, afterwards subtract (from one of the two digit numbers) that were first set down, the difference of the other digit number, that is to say, crosse-wise, And unto the remainder the figure which you kept before: & that shall be the second number, & thus shall you have your multiplication.

Example of the same figures, that is to say, of 7 multiplied by 6, the difference of 7 from 10. is 3: and the difference of 3 from 10, is 4: I set them down crosse-wayes as you sée: And then I say 3 times foure are 12. I set down 2, & kéep 1 in my mind then



then I ſubſtract 4 from 7, or elſe three from 6, it forceth not; from which at them, and there reſteth alwayes 3: unto the which I adde the unitie which I keep in my minde, and they are 4, which ſhall be the ſecond figure of the multiplication. And thus I finde that 7 multiplied by 6, maketh 42: as in the other operation. This practice hath no place where the 2 digit numbers (doe not exceed 10,) by adding them together, and then is multiplication eaſie enough without any rule.

Another way to know the multiplication of ſimple numbers, is by this table following: the uſe thereof is thus.

Firſt, you ſhall underſtand that the numbers from 1, and ſo deſcending downwards to 9 which are ſet in the left part or hanging margine of this Table, do betoken the multipliers of all ſimple numbers. And the elements or figures being put higheſt in every ſquare rome drawing toward your right hand, right againſt every of the multipliers, do ſignifie the multiplicands, which do appertaine unto the multipliers of the hanging margine. And the lower or inferior numbers in eve-

ry

ry ſquare tome, do betoken the product of that multiplication, which is made in multiplying the upper number over it, with the figure in the hanging margine, anſwering directly unto the ſaid ſquare: as by example.

The

The Table of Multiplication by all the Digit Numbers.

1	1	2	3	4	5	6	7	8	9
	1	2	3	4	5	6	7	8	9
2	2	3	4	5	6	7	8	9	
	4	6	8	10	12	14	16	18	
3	3	4	5	6	7	8	9		
	9	12	15	18	21	24	27		
4	4	5	6	7	8	9			
	16	20	24	28	32	36			
5	5	6	7	8	9				
	25	30	35	40	45				
6	6	7	8	9					
	36	42	48	54					
7	7	8	9						
	49	56	63						
8	8	9							
	64	72							
9	9								
	81								

First, because 1 doth not multiply, I have set in the upper margin the figures from 1 to 9: both in the higher and also in the inferiour rows, for 1 in the hanging margine, multiplyed by 1 the upper number in the first square bringeth but 1. So likewise 2 being the higher number in the second square of the upper margin, multiplied by 1 in the hanging margin bringeth 2 for the lower number in the second square of the upper margin: For 1 times 1 maketh but 1: and 1 times 2 maketh 2. Then 1 times 3 maketh 3, and 1 times 4 maketh 4. And so continuing toward the right hand, untill I come to the figure of 9 which is 1 times 9 maketh 9. Then afterwards I multiply 2 of the hanging margin by 2 which is the upper number of the square next toward the right hand, and that maketh 4 which is the product of 2 multiplyed by 2, that 4 I set under the 2, for 2 times 2 are 4; and 2 times 3 maketh 6: then 2 times 4 maketh 8, and 2 times 5 maketh 10, and so continuing unto 2 times 9, which maketh 18. The like is to be done with the third row, and so likewise of all the residue.

Example, I would know what is the pro-

product of 9 multiplied by 8. I seek in the hanging margine the multiplier 8, and amongst the squares directly against 8 drawing toward the right hand, I seek the multiplicand 9 in the higher row, and I finde the product right under 9 to be 72: Then 72 is the number which cometh of the multiplication of 9 by 8. And so is to be understanded of all the rest of the table; which table must be (of all men) learned by heart, or as they say, without booke: which being learned you shall the better attain to the rest of multiplication.

To come now unto the practice of multiplication; when you would multiply two numbers, the one by the other, you must set them down after the same manner as you did in addition, and in substraction: that is to say, the first figure of the multiplier under the first figure of the multiplicand the second under the second, and the third under the third, if there be so many, and then draw a right line under them, as in the other operations going before. After this, you shall multiply all the figures of the multiplicand by the multiplier, and set downe the figures (comming of any such mul-

multiplycation) under the line, every one in their due order and place.

Exemp. I would multiply 123 by 3, that is to say, I would know how much amounteth 3 times one hundreth twenty and three, the two numbers being placed in such order as is before said, you must begin towards the right hand: and say thus, 3 times 3 are 9: write down 9 under the line right against 3 for the first figure: secondly, by the same 3, you must multiply the second figure 2, and they do make 6 and I doe put 6 after the 9, under the line: Thirdly, by the same 3 you shall multiply the last figure 1, and they are but 3, set down 3 after 6 for the third and last figure. And thus is the work ended; wherby you shall finde that 123 being multiplyed by 3 maketh 369.

123
3
369

But when it happeneth that of the multiplication of one figure by another, the sum which commeth thereof shall be of two figures, as it happeneth often, then shall you write downe the first figure, and kéep the other figure to be added unto the multiplication of the next figure.

Ex-

Example, 6 men have gained (every one of them) 345 Crowns, I would know how many Crownes, they had in all. First, I multiply 6 by 5, they make 30. I write 0 under the line, and for 30 I do kéep 3 to be added to the next multiplication.

345
6
2070

Secondly, I say 6 times 4, are 24: unto the which I adde 3, which before I reserved: And they make 27: I write 7 in the second place under the line, & I kéep 2 to be added to the next Multiplication: Thirdly, I say 6 times 3, are 18, unto the which I adde the 2 which I kéep, and they make 20, the which I write all down, for because that is the last worke. And so I finde that 345, being multiplied by 6, do make 2070. But when the multiplier is of many Figures, you must multiply all the whole multiplicand by every one of those figures, and write the products every one orderly under his own figure.

Example, I would know how many dayes are past from the Nativity of Jesus Christ until the year 1560, full compleat. I must now multiply 1560 by 365 dayes, because there are so many dayes in one

whole year, The leap years being not reckoned, which have every one of them 366 dayes. Therefore first by the figure 5: I multiply all the higher figures, saying thus, five times 0 maketh 0: I write 0 under the line for the first figure, and because I keep nothing for the next place, I proceed and say 5 times 6 are 30: I set 0 under the line for the second figure, and I keep 3 to be added to the next multiplication: thirdly, I say 5 times 3 are 25: the which with the three that I keep are 28: I set down 8 for the third figure, and keep 2 to be added with the next multiplication: then coming unto the fourth & last figure, I say 5 times 1 are 5: the which with the 2 that I reserved are 7: I put 7 for the last figure of the first work by the figure 5, with the which figure I have no more to do, And therefore I cancell the same 5 with a little stroke through it, to signifie that I have finished with that figure. And forasmuch that in multiplycation there is always as many simple operations as the multiplier containeth figures, there resteth yet 2 worke to be made. I come therefore

1560	
365	
7800	

to

to the second worke which is the figure 6, by the which I must againe multiply all the figures of the multiplycand as I did by 5, and the first figure (which shall be produced) I doe put one rank more lower thē the figures of the work now last made by 5, not right under the first figure of the multiplyer 5, but under 6: that is to say, one degrée or place néerer toward the left hand: and one rank more lower than the first work: And I must put afterward every of the other figures which cometh of the same multiplycation in their order: thirdly, I do make the multiplication by the third figure ℮ that which shall come thereof I must set in his rank, as hereafter shall appear. And now I néed make no further discourse hereof, because that he which can do the first multiplycation by 5 may as easily do all the others. It shall therefore suffice to set here ūder the exāples of all the 3 sūdry works.

	1560	1560
1560	65	356
5	7800	9360
7800	9360	7800
	101400	4680
		569400

Now, if you will know how much all the three workings thus placed, do amount unto, which in value must be but one number: you must adde all the numbers which are come of all the 3 multiplications together, but not after the same manner as we have done in the Chapter of Addition, the first figure of the first rank vnto the first figure of the second rank and so of the third: but you must adde them in the same sort as you shall finde them situated and placed: that is to say, the first figure of the first rank alone by it self: the second of the first rank with the first of the second rank. The third of the first rank with the second figure of the second rank, and with the first of the third rank, and so of all the other as hereafter doth appear.

And thus the 1560 yeares do containe five hundred sixty and nine thousand four hundred dayes, not counting herein the dayes of the leap years, which are here in number 390 for then the whole sum of dayes should be 569790.

1560
365
7800
9360
4680
569400

Another

Another Example.

34560
2456

207360
172800
138240
69120

84879360

The Summe of Multiplication is thus, when you would multiply any number by 10, you shall only put one cipher o before all the numbers, that is to say, a degree nearer to the right hand as 345 multiplied by 10, maketh 3460. If you will multiply any number by 100, adde to the same number two ciphers thus, oo, if by 1000, adde 900. And to be briefe, when the last figure of the multiplier is 1 & all the rest be ciphers, ad so many ciphers to your multiplicand, as there shall be found Ciphers in your multiplier. But if in your multiplying, the last figure were not, but that there were onely certaine Ciphers in the beginning: and that the other were signifying figures, and likewise those of the multiplycand, then shall you put those

Ciphers apart, and multiply the signifying figures of the other. Then adde unto the product of that multiplycation, all the Ciphers which you did before put apart As if I would multiply 46000 by 3500. I put apart the three Ciphers of the first, and the two Ciphers of the second numbers, which are in all 5 Ciphers 00000: And then I multiply 46 by 35, and thereof commeth 1610: before that which toward the right hand, I adde the 00000 that I did put apart, and then the whole product will be 161000000.

46
35
230
138
161000000

Of

Chap. 5.
Of Division.

Division or Partition is, to seek how many times one number doth containe another, or else how often times one number may be found in another, for in the work of Division there are required two numbers to be first known, for the finding out of the third. The first number known, is called the dividend or number which is to be divided, and that must be the greater number. The second number is called the divisor, and that is the lesser. And the third number which I do seeke, is called the quotient. As if I would divide 36 by 9. the dividend shall be 36, and the divisor is 9. And for because that 9 is contained in 36 4 times, that is to say, 4 times 9 do make 36, the quotient shall be 4, as if you marke well, how many times 9 is contained in 36, you shall finde it 4 times: and therefore 4 shall be the quotient.

The Practise.

Write down first the dividend in the higher number, and the divisor underneath in such sort, that the first Figure of the divisor toward the left hand, be under the first Figure of the dividend, and every figure of the same divisor under his like, that is to say, the first under the first, the second under the second, the third under the third, and so consequently of the other, if there be so many, which is contrary to the other three kinds before specified, but yet you must consider further if all the lower figures of the divisor, may be taken out of the higher figures of the dividend by the order of substraction or not. The which if you cannot do, then must you set the first figure of the divisor (toward the left hand) under the second figure of the dividend, and so consequently the rest in their due order, if any be to be set down, every one of them under his like, as before is said. And then draw a line betwæn the dividend and the divisor. And at the end of them another crooked line, behinde the which toward the right hand shall be set your quotient. As by this example following, where the

the diuisor is but of one figure.

If you would diuide 860 by 4, you must set down 4 under the 8 with a line betwéen them, as here under you may sée.

The Dividend. 860

The Diuisor. 4

And then you must séek how many times the diuisor 4 is contained in the higher number, that is to say, in 860, the dividend answering to him as in this our example, I must séek how many times 4 is contained in 8, in the which I finde it 2 times, then I write down 2 apart behinde the croked line as here you may sée, which shall be the first figure of the quotient to come: secondly, by this figure 2 (being thus put apart) I must multiply the diuisor 4; and under the same multiplycation, I must set that number which commeth of the same multiplication: as 2 times 4 doe make 8 the which 8 I doe set under the diuisor 4. Thirdly, I doe subtract the product of the said multiplication (of the quotient by the diuisor) that is to say 8 from the higher number correspondent to the same in saying 8 frō 8, there remaineth nothing, & then I can-

860
4|2
8

cancell or ſtrike out that which is done as you ſee. In theſe three operations and works is comprehended the Art of Diviſion. The which are to be obſerved from point to point, for there is no diverſity in the finiſhing of the ſame, which is thus.

Now ſecondly, I muſt remove my diviſor one place nearer toward my right hand, as in preceding with our example. Here you ſee I remove my diviſor 4 which was under 8 and I ſet it under 6, then I ſeek how many times 4 is contained in 6: where I find it but one time, then I ſet 1 behind the crooked line next unto the firſt figure of the quotient 2, a degree or place nearer my right hand, afterward by this laſt and new figure 1, I multiply the diviſor 4, and that maketh but 4 (for an unity which is but 1, encreaſeth nothing) I abate therefore 4 from the higher figure 6, and there reſteth 2, the which 2 I ſet over the 6: and I cancel the 6, for ſo muſt I doe when there reſteth any thing after I have made the ſubtraction. Thirdly, for as much as there yet remaineth another figure in the dividend, I re-

2
860(21
4

remove again the diviſor, and I ſet it under the cipher 0. Then I ſeek how many times 4 is in the higher number, which is 20, where I may finde it 5 times, I put therefore 5 behinde the crooked line for the third and laſt figure of the quotient. then by the ſame 5, I multiply the diviſor 4, and that maketh 20, the which 20 I abate from the higher number and there reſteth nothing. And ſo is the diviſion ended: and thus I have found that 860 being divided by 4, bringeth for the quotient 215: that is to ſay, that 4 is contained in 860, two hundred and fifteen times. This is the moſt eaſieſt working that is in diviſion, but that which followeth appertaineth to the whole and perfect underſtanding of the ſame. When the firſt figure of your diviſor toward your left hand is greater then the firſt of the dividend, you muſt not place the firſt figure of your diviſor right underneath the firſt of the dividend, but under the ſecond figure of the ſame dividend, nearer to your right hand, as before is ſaid Therefore when the diviſor is of many figures, and that

	3	
860		(215
	4	
	28	

you

you have to seek how many times it is contained in the higher number, (for the more easier working) you must not seek to abate the divisor all at one time, but you must see and mark how many times the figure of the same toward the left hand is contained in the higher number answering to the said number, and then to worke after the same manner as is before taught.

Example, I have 316215 crownes to be divided among 25 men, and for to make my division, I must not put the first figure of the divisor which is 4, under the first of the Dividend, which is three, because that 4 is a greater number then 3. And further you know, that I cannot take 4 out of 3, wherefore I must set the 4 under the second figure of the higher number, that is to say, under 1, and the figure 5 of the divisor, right under the 6, as here you may see.

So that I must first seek, how many times 45, is contained in 316, which is but a part of the Dividend. Wherefore for the more easie working I need but to seek how many times 4 is contained in 31. And be-

316215
45

because I may have it 7 times, I put 7 behind the crooked line, as is afore said: then by 7 I multiply all the divisor 45 and they are 315: the which I set under the same divisor the first figure under the first: and the other in order towards the left hand. Then I substract 315, from the higher number 316: and of this first working there remaineth but 1, the which I set over the 6, and I cancell likewise the 315, and the other figures 316, and also the divisor 45: and then it will stand thus as in the margent.

1
316215 (7
45
315

And when I come to remove the divisor, and that I must seek how many times it is contained in the higher number, if I see that I cannot finde it there, that is to say, that if the higher number, be lesser then the divisor, as it is in this example, then must I put a Cipher in the quotient behinde the crooked line, and if there remaine any figures in the divident which are not yet finished: I must remove the divisor againe nearer toward my right hand by one place, for to finde a new figure in the

the quotient. As in this one example, for after that I have removed the divisor, I seek how many times 45, is contained in 12, and because I cannot have 45 in 12, I put a 0 behinde the crooked line after 7: then without multiplying or abateing, I remove again the divisor nearer towards my right hand, and I seek how many times 4 (which is the first figure of the divisor) is in the higher number, that is to say in 12, whereas I finde it 3 times: I put 3, behinde the crooked line, for the third figure of the quotient: then by the same figure 3, I multiply the divisor 45, and thereof cometh 135. And in the number over it there is but 121, so that I cannot take it out of 121, which is the lesser number. And therefore here is to be noted, that if it happen; that the figure being last found which is put in the quotient, doe produce or bring forth a greater number (in multiplying all the divisor by the same) than that which is over the said divisor, you must then

1
3x6215
45 (70

1
3x6215
45 (703
135

then make the same figure of your quotient (which you do put down) lesser by 1, and after that you have cancelled the first multiplication, you must make a new. And the same must be done so oftentimes: as (in decreasing the same) it may produce a lesser number, or at the least a number equall to that which is over it, as in the last work, for because that the divisor being multiplied by 3, bringeth 135, which amounteth to more than 121, Therefore the same product must be cancelled, and the figure 3 which I did put in the quotient, must be also changed into a figure of 2. Then by the said 2, I must multiply the divisor 45, and thereof commeth 90, the which I abate from 121, and there remaineth 31. And then will the sum stand thus as followeth.

x3

3x6215

45 2

x35 (703

90

And here is also to be noted, that the summe which remaineth must be alwayes lesser

lesser then the divisor. Then finally, I remove the divisor to the two next figures towards the right hand, and I séek how many times 4 is in 31, and for because I finde it 7 times, I put 7 in the quotient, by which I multiply the divisor, and thereof cometh 315. the which I abate from the higher number of the Dividend, and there remaineth nothing as you may sée.

```
  13
 316215
    45          (7027
   315
```

But if it happen that after the division is ended, there do remaine any thing in the dividend, as often times there doth; I must also set them that remaine apart behinde the crooked line, after the entire quotient, and the divisor right under the same remaine, with a line betwéen them both. As in this division following, where there remaineth 3 in the last worke. And what the same doth signifie shall be taught unto you when I shall treat of fractions or broken numbers.

i.

II

467859

456 (1

iii.

2

xx73

467859

456

gxx (102

ii.

II

467859 (10

456

iiii.

2

xx733

467858 3/276

456 (1026

2736

In summe, all the whole practice of division may be kept in remembrance by three letters, that is to say: S, M, and A, which three letters doe signifie, to seek, to multiply and to abate.

First, I must seek how many times the divisor is contained in the higher number: then by the quotient which I finde) I must multiply the divisor: Finally, I must abate the product of that multiplication, from the higher number correspondent to the same, that is to say, out of the dividend, answering to the divisor.

And further, besides this kinde of working in Division: the which is regular and commune; I will here put another man-

ner of working very easie; the which shall serve for such divisions as are more difficult to be wrought: that is to wit, when the number to be divided is very great, and the divisor great also, and it shall serve again for to avoid errour in supputation, and for the placing of fewer figures in the quotient: and consequently it shall save much labours unto them which as yet have not much studied in this Art. The practise whereof is thus as followeth.

If you would divide 7894658 by 643 First, you shall understand, that although the figure of the divisor toward your left hand, may be found many times in the higher number, as 10 times, 12 times, or more; yet is it so that you must never put but one figure only at a time in your quotient. And you shall at no time put any number in your quotient which exceedeth the figure of 9, that is to say, any number being greater then 9. And therefore for to come unto your practise, write downe your divisor one time, and behinde it towards your right hand, draw down a line straight, and right against the same divisor behinde the line toward the right hand, put

this

this figure 1. Then double your said diuisor, and right against the same which you haue doubled put behinde the line the figure of 2. This done, you shall adde unto the same number that you doubled your said diuisor, and right against the same product behinde the line you shall put the figure of 3, and unto this third product you must adde againe your diuisor, and right against the same product behinde the line, set the figure 4. And thus must you doe untill you come to the figure of 9, in such sort, that every of the products do surmount so much his former number, as all the diuisor doth amount unto: placing at the right fine of every product behinde the line, the number which signifieth how much he is in order. That is to say, right against the fifth product, you must put 5, and right against the first product, you must put six: and so likewise of all the other.

The Example followeth in the next page.

Example of the diuisor proposed, 643: First, of all I write down 643, and right against the same behinde the line towards my right hand, I put 1: Secondly, I double 643, and they make 1286: and right against that Summe behinde the line, I put 2. Thirdly, unto that same 1286, I adde the Diuisor 643, and they are 1929, and right against the same I set 3. Fourthly, unto the said 1929, I adde the diuisor 643, and they make 2572: and right against the same I put 4. And thus must you do alwayes by encreasing so much every product, as the Diuisor doth amount unto, untill you have so done nine times, as you see in this present Table.

643	1
1286	2
1929	3
2572	4
3215	5
3858	6
4501	7
5144	8
5787	9

This being done, you must set down your diuisor under the diuidend 7894658, after the same manner as is before declared: that is to say, 643, under the 3 first figures of the diuidend toward your right hand, namely under 789. Then must you seeke how many times 643 are contained in

in 789: And for to know the same, you must look in the aforesaid table if you may there find the same number 789, the which is not there. Therefore you must take a lesser number, the nerest to it in quantity that you can finde in the table, the which is 643, which number hath against it on the right hand of the line, this digit 1. Then take the said 1, and put it behinde the crooked line, for the first figure of the quotient.

Then you must abate 643, from 789, and there will remaine 146, the same shall you put over the 789, and cancell the 789: and thus is the first worke ended. Then set forward the divisor one figure nerer to your right hand, and seeke a new quotient as you sought this, where you finde the higher number ober your divisor to be 1464. The which seek in the Table, & for because you cannot finde it there, you must take a lesser number the nerest to it that you can finde, and that is 1286: which number hath against it this digit 2. Therefore you must put 2, for the second figure of the quotient behinde the line, and then abate 1286, from the said 1464, and

there will remain 178. Thirdly remove forward the diuisor as you did before, and you shall finde the higher number ouer it to be 1786, so that the next lesser number to it in your table, is againe 1286, put therefore once againe 2, in the quotient for the third figure and abate the said 1286, from 1786, so there will remaine 500.

Fourthly, set forward the diuisor: and the higher number ouer it, is 5005, and the next lesser number to it in your table, is 4501, right against the which is 7, put 7 in the quotient for the fourth figure. And after that you haue abated 4501, from 5005: there will remain 504. Finally, remoue forward your diuisor unto the last place, and you shall finde the higher number ouer it to be 5048. And the next lesser number to it in your table, is 4501. Therefore set 7 againe in the quotient for the fift and last figure. Then subtract 4501. from 5048, and there will remaine 547: which must be put at the end of the whole quotient, with the diuisor under it, and a line betweene them in this manner following.

(12277 547

The

The Summe of Division.

When you would divide any number by 10, you must take away the last figure next toward your right hand, and the rest shall be the quotient. Example: As if you would divide 46845, by 10: take away the 5, and then 4684 shall be the quotient, and the 5 shall be the number that doth remaine. Likewise when you would divide any number by 100, take away the two last figures towards your right hand, and if you would divide by 1000; take away three figures. if by 10000, take away foure figures. And so of all other, when the first figures of the divisor toward the left hand shall be onely 1, and the rest of the same divisor being but Ciphers.

Here follow the proofes of Addition, Subſtraction, Multiplication, and Diviſion.

The proofe of Addition.

When you would proue whether your Addition be well made, conſider the figures of the numbers which be added, euery one in his ſimple value, not, hauing any regard to the place where he ſtandeth, but to reckon him as though he were alone by himſelf, and then reckon them all, one after another, caſting away from them the number of 9, as oft as you may. And after your diſcourſe made, kæp in minde the ſame figure, which remaineth after the nines be taken away: or elſe ſet the ſame in a void place at the vpper end of a line. For if your addition be well made the like figure will remaine, after that you haue taken away all the nines out of the totall ſum of the ſame Addition, as often-times, as you may there find any: as in this addition which here you ſæ there remaineth 2, for each part.

24567	2
5329	
481	
30377	2

The

The proof of Subſtraction.

ADde the number which you doe ſubſtract, unto the number which remaineth after the Subſtraction is made, and if the totall ſum of that addition be like unto the number, from the which the ſubſtraction was made, you have done well, otherwiſe not: as in this Example doth appear where you ſee the number which is to be ſubſtracted from 5463, is 3584, and the number which doth remaine is 1879 the which 2 ſums being added together doe make 5543, which is like to the higher number, out of the which the ſubſtraction was made, as before is ſaid.

5463.
3584.
1879
5463

The proof of Multiplication.

THe proofe of Multiplication is made by the help of diviſion. For if you divide the number produced of the multiplication, by the multiplier you ſhall find the higher number, which is the multiplicand.

The proof of Diviſion.

TO know if your diviſion be well made, you muſt multiply all the quotient by your diviſor, and if any thing doe re-

remaine after your division is made, the same you shall add unto the product which commeth of the multiplication, and you shall finde the like number unto your dividend, if you have well divided: otherwise not.

Chap. 6.

Of Progression.

Progression Arithmeticall, is a briefe and speedy assembling or adding together of divers figures or numbers, every one surmounting the other continually by equall difference, as 1,2,3,4,5,&c. Here the difference, from the first to the second, is but of 1, and so doe all the other, every one exceed his former figure by 1 still to the end. Likewise 2,4,6,8,&c. do proceed by the difference of 2. Also 3,6,9,12, &c. do every one differ from other by 3. And so may these numbers continue infinitely after his order, in adding unto the 3 number, the quantity wherein the 2 doth differ from the 1: Likewise adding the same difference unto the 4 number, also to the 5. and so unto all the other. as 1,4, the difference of the second to the first is three, adde 3 unto 4, and they are 7 for the third number;

ber. Then adde 3 unto 7, and they make 10 for the fourth number, and ſo all other.

Then if you will adde quickly the number of any progreſſion, you ſhall do thus firſt, tell how many numbers there are, & write their ſum down by it ſelfe, as in this example, 2, 5, 8, 11 and 14, where the number of their places are 5 as you may ſee, therefore you muſt ſet downe 5 in a place alone as I have done here in the margent. Then ſhall you adde the firſt number and the laſt together, which in this example are 14 and 2, and they make 16, take halfe thereof which is 8, and multiply it by the 5 which I noted in the margent for the number of the places. And the ſumme which amounteth of that multiplication, is the juſt Summe of thoſe figures added together. As in this example: 8 multiplied by 5 do make 40: And that is the total Summe of all the figures. Another example of parcels that are even, as thus, 1, 2, 3, 4, 5, and 6. So that in this example you muſt likewiſe note down the number of the places, as before is taught, and then adde together the laſt number and the firſt. And the Summe which com- 5

meth

meth of that addition, ſhall you multiply by halfe the number of the places which before are noted, and that which reſulteth of the ſame multiplication, is the whole ſum of all thoſe figures, as in this former example, where the number of the places is 6, I note the 6 apart, and then I adde 6 and 1 together: which are the laſt and firſt numbers, and they make 7, the which I multiply by 3 which is halfe the number of places, and they make 21, and to ſo much amounteth all thoſe figures added together.

Queſtion done by Progreſſion Arithmeticall.

1 A Merchant hath ſold 100 Kerſies after this manner following, that is to ſay, the firſt peece for 1 s, the ſecond peece for 2 s, and ſo forth riſing 1 s, in every peece of Kerſey unto the hundreth peece. The queſtion is to know, how much he ſhall receive for the ſaid 100 peeces of Kerſies? Anſw. It behoveth you to know the addition of the 100 termes, in this progreſſion: And therefore you muſt adde

1 6,

1 s, which is the price of the firſt peece with 110 s, which is the price of the laſt peece, and thereof commeth 101, the ſame 101 you muſt multiply by halfe the number of places, that is to ſay, by 50, and thereof commeth 5050 s, which being diuided by 20 s, thereof will come 252 li. 10 s 0 d, which is 2 li 10 s 6 d a peece one with another. Thus the 100 Korſets are ſold by the ſaid Marchant for 252 li 10 s 0 d. The practiſe followeth.

100		
1		
101	x 1 5050	(252 li 10 s.
50	2220	
5050		

Queſtions of Progreſſion.

2 I Would lay 100 Stones or other things in a right line, and every of the ſaid ſtones to be a juſt pace one from another: and one pace from off the firſt ſtone there ſtands a basket. I demand how many paces a man ſhall go in gathering up the ſaid ſtones, and bearing them unto the Basket one ſtone after another? Anſwer,

First,

First, when he fetcheth the first stone and puteth it into the Basket, he maketh 2 paces, for the second 4 paces, for the third 6 paces, for the 4th 8: & so forth unto the last stone: wherefore the last terme shall be 200, unto the which you must adde the 1 terme which is 2, and they make 202, wherefore the half is 101, the which you shall multiply by 100, which is the number of the termes in your progression; or else multiply 202 by 50, which is halfe the number of paces, and thereof will come 10100 paces, and so many paces shall he goe in all.

Questions of Progression Arithmeticall.

1 THere is a messenger which goeth every day 8 miles, another man followeth him incontinently, and he goeth the first day 1 mile, the second day 2 miles, the third day 3 miles, and so increasing his journey, every day one mile by naturall progression. The question is to know in how many dayes the second man shall have overtaken the first: Answer, You

must

muſt conſider that 8 is the middle or halfe as well of the termes, as of the number of the dayes: And therefore double 8, and thereof cometh 16: ſubſtract 1, and there will remaine 15: and in ſo many dayes ſhall he have overtaken the firſt meſſenger. The proofe thereof is very eaſie, If the ſecond had gon the firſt day 2 miles: the ſecond 4 miles, the third day 6 miles, and ſo increaſing every day his journey by 2, in how many dayes ſhould he have overtaken the firſt man, for to do this you muſt perceive that 4 is the middle and fourth terme. Therefore double 4 and they make 8, from the which ſubſtract 1, and there remaineth 7, and in ſo many dayes he ſhould have overtaken him.

Queſtions of Progreſſion Arithmeticall.

There is one man departeth from London to Cheſter, and ſo to Carnarvan, the diſtance being about 200 miles: he goeth the 1 day 1 mile, the ſecond day 2 miles, the third day 3; and ſo orderly by naturall progreſſion. Another man departeth at the ſame inſtant from Carnarvan

narvas to London, and goeth the firſt day 2 miles, the ſecond day 4 miles, the third day 6 miles; and ſo encreaſing every day 2 miles. The Queſtion is, to know in how many dayes theſe two perſons ſhall meet together? Anſwer. Firſt, you muſt conſider, that he which goeth by Progreſſion naturall, maketh but halfe the way the other doth, ſo that he ſhall have made but the one 3 part of the way at their meeting together. Take therefore the $\frac{1}{3}$ part of 200, & you ſhall have $66\frac{2}{3}$ Then you muſt ſeek 2 numbers, whereof the greater of them, may be double unto the other leſſe 1; and that the 1 of them being multiplied by the other, the product of them may be $66\frac{2}{3}$, or little more, ſo that the more do not exceed the value of the greater terme as here in this queſtion, the 2 neereſt numbers are 12, and $6\frac{1}{33}$, which multiplied the one by the other, do make 78, which is $11\frac{1}{3}$ more then is $66\frac{2}{3}$ wherefore that day when they ſhould meet together, the firſt had gone but $\frac{1}{3}$ of a mile of his journey, which was upon the 12 day: then if you will know what part of the day that they did meet, you muſt divide $\frac{1}{3}$ by 12, and you

ſhall

ſhall find $\frac{1}{11}$ of a day. Therefore in 11 dayes and $\frac{1}{11}$ part of a day, that is upon the 12 day, they ſhall meet together.

5 IF a man doe owe unto me 1000 Crowns, to be paid in 20 dayes or terms by Arithmetical progreſſion: The queſtion is, is to know with what number he ſhall begin & continue his progreſſion? Anſw. To doe this you muſt adde 1 unto 20, and they make 21, the which you ſhall multiply by 10, which is the halfe number of the places, and thereof commeth 210, and therefore divide 1000 by 210, and thereof will come $4\frac{16}{21}$, the paiment of the firſt day, and by this number doth the ſaid progreſſion encreaſe in this ſort following: $4\frac{16}{21}$ $9\frac{11}{21}$ $14\frac{6}{21}$ $19\frac{1}{21}$, &c. And ſo of all others.

A man oweth me 400 li. to be paid in 10 yeares by progreſſion Arithmeticall, that is to ſay, 40 li. at the end of the firſt yeare, and every yeare following 40 li. to the end of 10 yeares: he offereth to pay me the ſaid 400 li. all at one payment. The queſtion is to know, at what time he ought to pay me the ſame at one paiment, that I

be not interessed in the time? Answ. adde 1 unto the number of the termes which are 10 and they make 11, wherefore you must take the halfe, that is to say $5\frac{1}{2}$: Therefore he must pay me at 5 yeare and $\frac{1}{2}$ the said 400 li. all at one time; for that which he payeth before, is equall to that which remaineth unpayed. This rule hath place only when the payments are equal. But if it happen, that the last payment be lesser then the others you must in this case, put the last payment over one of the others, for to make thereof a fraction: the which must be added unto the number of the termes, and the halfe of the said sum being taken, shall shew the time that the said payment ought to be paid at once As if the said party did owe me but 380 pounds, to be paid every yeare 40 li. it is certain that he must have 10 yeares to end the payments. And it is true that upon the 10 day there would remain but 20 li. to be paid. And therefore put 20 over 40 in this sort $\frac{20}{40}$ and that maketh $\frac{1}{2}$, the which you shall adde unto the number of termes, and you shall have $10\frac{1}{2}$, whereof the halfe which is $5\frac{1}{4}$, doth shew that he must pay the said 380 li at 5

yeares

years $\frac{1}{4}$, all at one payment, and so of all such like.

Progression Geometricall is when the second number containeth the first in any proportion. as 2,3 or 4 times, and so forth. And in like proportion shall the third number containe the second, and the fourth number containe the third, and the fifth the fourth, As 2,4,8,16,32,64: here the proportion is double.

Likewise, 39,27,81, and 243, are in triple proportion.

And 2,8,32,128, and 512 are in proportion quadruple.

That is to say, in the first example, where the proportion is double, every number containeth the other 2 times, as 4 containeth 2, two times: 8 containeth 4 two times, &c. In the second example of triple proportion, the numbers exceed each other three times. And in the third example, the numbers exceed each other foure times, & thus you see that Progression Arithmeticall differeth from Progression Geometricall, for that in Progression arithmeticall the excesse is only in quantity, but in Progression Geometricall, the excesse is in proportion.

Now if you will easily finde the Sum of any such numbers, you shall do thus, consider by what number they be multiplyed, whether they be multiplyed by 2, 3, 4, 5, or by any other: & by the same number, you must multiply the last sum in the progression. And frō the product of the same multiplication, you shall abate the 1 number of that progression: and that which rampineth of the said multiplycation, you shall divide by 1 lesse then was the number by the which you did multiply, and the quotient shall shew you the sum of all the numbers in any progression. As in this example, 5 15, 45, 135, and 405: which are in triple proportion. Now multiply 405, which is the last number by 3: because they are in triple proportion, and they are 1215, from the which you shall abate the 1 number of the progression, which is 5, and there remaineth 1210: the which you shall divide by a number lesse by 1 then that which was, by the which you did multiply, that is to say, by 2; & you shall finde in the quotient 605: which is the totall sum of the numbers of that progression. Likewise 4, 16, 64, 256, & 1024, which are the proportion quadru-

ple:

ple: therefore you ſhall multiply 1024, by 4, & there will come 4096, from the which abate the 1 numbar 4, & there will remaine 4092: The which you muſt divide by 3, & you ſhall finde in your quotient 1364: which is the totall ſum of that progreſſion, and this ſhall be ſufficient for Progreſſion.

A Queſtion of Progreſſion Geometricall.

A Merchant hath ſold 15 yards of Satten, the firſt yard for 1 s. the ſeconde 2 s. the third 4 s. the fourth 8 s. and ſo increaſing by double progreſſion Geometricall. The queſtion is to know how much the ſaid Merchant ſhall receive for the ſaid 15 yards of Satten? Anſw. Firſt, it is needfull to know, how much the whole numbers of the ſaid progreſſion do amount unto together. And for to do it, you muſt finde the laſt terme, therefore you muſt ſet down the ſaid Progreſſion unto the 8 term, which is 128: the which you ſhall multiply by it ſelfe, and thereof commeth the fifteenth terme, that is to ſay, 16384, the ſame ſhall you multiply by 2, for becauſe the Progreſſion is double And thereof will

come 32768 from the which you must subtract the first terme which is 1. And the rest being 32767, is the just Sum of the 15 termes: and consequently the 15 yards of Satten shall be worth 32767 shillings, the which are 1638 li. 7 s.

Chap. 7.

Of the Rule of Three, called the Golden Rule: or the rule of four proportionals.

The Rule of Three, is the chiefest, most profitable, and the most excellent Rule of all the Rules of Arithmetick. For all other rules have need of it, and it passeth all other, for the which cause it is said, that the Philosopher did name it in the Golden Rule. And after others opinion and judgment it is called the Rule of Proportion of 4 numbers. But now in these latter dayes, by us it is called, The Rule of Three, because it requireth three numbers in his operation. Of the which three numbers, the 2 first are set in a certaine proportion, and in such proportion as they be established, this Rule serveth to finde out

out unto the 3 number, the 4 number to him proportioned, in such sort as the 2 is proportioned unto the first. Not for that, that the foure numbers, nor yet the three, are to be proportionall, or set in one proportion, but such proportion as is from the first to the second, ought to be from the third unto the fourth, that is to say, if the 2 number doe containe the 1 two times or more, so many times shall the fourth number containe the third. And note well that the first number and the third, in every rule of three ought and must be alwayes of like denomination, and of one condition and nature, and the second number, and the 4, must likewise be of one semblance and likenesse, and are dissemblant, and contrary to the other 2 numbers: that is to say, to the first, and the third. And if you doe multiply the first number by the fourth, and the second number by the 3, the product of your two multiplications will be equall. Likewise if you divide the one semblant by the other, that is to say, the third number by the first, and likewise the one dissemblant by the other, that is to say, the 4 number by the second (which are dissem-

blant to the other two numbers) your two quotients will also be equall.

The stile and manner of this rule is thus; you must set downe your three numbers in a certaine order, as by exemple following shall appeare. And then you shall multiply the third number by the second, and the product or number that commeth of the same multiplication, you must divide by the first number: or otherwise divide the first number by the second, & the quotient thereof shall be your divisor unto the third number, that is to say, the third number shall be divided by the quotient of the foresaid division, that is by the quotient of the first number divided by the second. Or otherwise divide the second number by the 1, and that number which commeth into your quotient you shall multiply by the third number. And thus shall you have the fourth number which you seeke for. And thus is your fourth number in such proportion unto the third, as your second number is unto the first.

Example.

IF 8 be worth 12, what are 24 worth after the rate? or else if 8 require 12

for

for his proportionall, what will 14 demand? The which three numbers may conveniantly be set in such order as hereafter doth appear: If 8 make 12, what will 14 make? you must multiply the third number 14 by the second which is 12, and thereof commeth 168 for the whole product of this multiplication: the which (as the rule teacheth) you must divide by the first number, that is to say by 8, and thereof cometh 21. and so much are the 14 worth. This is the way which is most used.

8. 12. 14.

14
12
28
14
168

168 (21
88

Otherwise divide 8 by 12, which you cannot do, for they are $\frac{8}{12}$, wherefore abbreviate $\frac{8}{12}$ and they are $\frac{2}{3}$ for your Quotient, then divide the third number 14 by the said $\frac{2}{3}$, multiplying 14 by 3, which maketh 42, divide 42 by 2, and you shall have 21 as before. Or else divide the second number 12, by the first number 8, and thereof com-

1
4
8
12
6
3

commeth $1\frac{1}{20}$, the which $1\frac{1}{5}$ you shall multiply by the third number 14, and thereof will come 21, as is abovesaid and thus must you doe of all other: and although, that the numbers of this rule may be found in three differences, for sometimes they are whole numbers and broken together, sometimes broken number, and broken together, and sometimes all whole numbers: if they be whole numbers, you must doe none otherwise then you did in the last example. But in case they be broken numbers, or broken and whole numbers together, the manner and way to doe them, requireth a certaine variation and dificulty, according to the variety of the numbers that shall be proposed: the which operation easily to doe, and unvariable, this Rule teacheth.

The three numbers being set down according unto the order of the whole numbers aforesaid, without any broken number, let 1 be put alwayes underneath every whole number, with a line between them fraction-wise, as thus $\frac{1}{1}$, and that 1 is denominator to every such whole number. But when you have whole number and broken

broken together, they must be reduced, and added with their broken number, and if there be broken number without any whole number, the same broken must remaine in their estate.

The Rule of Three in Fractions.

This being done, you shall multiply the denominator of the first number, by the numerator of the second, and multiply the product thereof again by the numerator of the third number: And so shall you have the dividend or number which must be divided, then multiply the numerator of the first number, by the denominator of this second, and multiply againe the product thereof, by the denominator of the third number, and that which commeth of the multiplication shall be your divisor. Then divide the number which is to be divided by the divisor, and you shall finde the fourth number that you seek. Of the which manner and fashions, of the rule of 3 are divers kinds, whereof the first is of 3 whole numbers, as was the last example, and here followeth the second.

If 15 pounds do buy me 2 clothes, how many clothes will 300 pounds buy me of the

the same price that the 2 cloaths did cost? set down your three numbers thus.

The Example followeth.

Lib.	*Cloaths,*	*Lib.*	
15	2	300	x
		2	600(40
		600	x55
			x

And then as you see, you must multiply the 3 number which is 300 l. by 2 which is the second number, and thereof commeth 600, the which 600 you must divide by the first number 15, and you shall finde in your quotient 40, which is 40 cloaths, and so many cloaths shall you buy for 300 li. as appeareth by practise here above written, And here you must mark that the first number and the third in this question be of one denomination, as before I have declared, and likewise the 2 and the fourth numbers which you have found, are of one semblance and likewise, but in case that the first number and the third in any question be not of like denomination, you must (in working) bring them into one denomination or nature, as in this example following.

lowing. If 12 Nobles doe gain me 6 French Crownes, how many French crowns will 48 pounds gain me? Here you see that the denomination of the first number, is Nobles and the denomination of the third is pounds: wherefore before you doe proceed to worke by the rule of 3, you first turne the pounds into Nobles, in multiplying 48 pound by 3, and they make 144 nobles, for there is in every pound of mony 3 nobles: or otherwise if you will, you may bring the first number being 12 nobles into pounds by dividing them by 3, and thus shall your first and third numbers be brought into one denomination: then shall you set downe your 3 numbers in order thus.

If 12 nobles doe gaine me 6 French crownes, what shall 144 nobles gaine? the which 144 are the nobles which are in 48 li. Then multiply the third number 144, by the second number 6, and thereof commeth 864, the which you must divide by 12 nobles, and thereof commeth 72 French Crownes.

And so many French Crownes will the 144 nobles gaine me.

Nobles

Nobles.	Crownes.	Nobles.
12.	6.	144.
144	xxo	Nobles.
6	864	(72
864	xxx	
	x	

There is yet a more exact way whereby to worke in the rule of three, which is thus: You must mark if the third and first numbers in the rule of three, may both be divided by one like divisor: the which after you have divided them, you shall write downe each of the quotients orderly in the said rule of 3, every one of them in his owne place, as though those were 2 of the numbers, of your question, and not changing the middle number, that is to say the second. As thus, if 50 crownes doe buy me 44 yards of cloath, how many yards shall I have for 120 crowns? Here you may see that the third and the first numbers, may be divided by 10, which in the 3 number is found 12 times, and in the first 5 times, Wherefore you shall put 12 for the 3 number in the rule of three instead of 120: and 5 for the first number instead

of

of 50, and let 44 remain ſtill in the mid-ſt for the ſecond number after this ſort as followeth, and then worke by the rule as before.

Crowns	Yards.	Crowns.
5.	44.	12.
	12.	
	88	3
	44	528 (105 3/5
	528	555

You muſt multiply 44 by 12, and thereof commeth 528: divide the ſame 528 by 5, and you ſhall finde in your quotient 105, 3/5, and even ſo many yards ſhould you have: found if you had wrought the rule of 3 by the firſt numbers propoſed. There is yet certaine other varieties in working by the rule of 3, but for that they require the knowledge of fractions, and becauſe they are not ſo eaſie as this firſt way, which is common, therefore content your ſelves with this ſame, untill you have learned the fraction, the which by Gods help I intend to ſet forth in the ſecond part of this booke, incontinently after that I have firſt taught you the backer rule of three.

Of

Of the backer rule of Three.

The backer rule of thrée is so called, because it requireth a contrary working to that, which the rule of thrée direct doth teach, whereof I have now treated. For in the direct Rule of three, the greater the third number is, so much the greater will the fourth be. But here in this backer rule it is contrariwise, for the greater the 3 number is, so much lesser will the fourth be. Then whereas in the rule of thrée direct, the third number is multiplyed by the second, and the product thereof divided by the first: here you must multiply the second number by the first, and divide the product of the same by the third, and the number which commeth in the quotient, answereth to the question, for such practice commeth oftentimes in use: In such sort that if you should worke the same by the rule of thrée direct, and not to have a regard unto the Proportion of the question, you should then commit an evident and open error.

Example.

If 15 shillings worth of Wine will serve for the ordinary of 46 men when the Tunne

Tunne of Wine is worth 12 pounds: for how many men will the same 15 shillings worth of Wine suffice, when the Tun of Wine is worth but 8 pounds? It is certaine that the lower the price is that the Tun of Wine doth cost, so many more persons will the said 15 shillings in wine suffice. Therefore set downe your numbers thus: if 12 pounds suffice 46 men, how many men will 8 pounds suffice? you must multiply 46 by 12, and thereof commeth 552, the which you shall divide by 8, and thereof commeth 69; and unto 69 men, will the said 15 shillings worth in wine suffice, when the Tun Wine is worth but 8 pounds, as hereafter doth appeare by practise.

Lib.	Men.	Lib.	
12	46	8	
	12	7	
	92	552	(69
	46	88	
	552		

2. Likewise a messenger maketh a journey in 24 dayes, whe the day is but 12 houres long: In how many dayes shall

he make the same journey, when the day is 16 houres in length? Here you may perceive that the more houres there are in a day, the fewer dayes the messenger will be in going his journey. Therefore write downe your numbers thus, as here you may see.

Houres.	Dayes.	Hornes.	
12	24	16	4
	12		x2
	48		288
	24	x66	(18
	288		x

And then multiply 24 dayes by 12 houres, and thereof commeth 288: divide the same 288, by the third number 16, and you shall finde 18, the which is 18 dayes, and in so many dayes will the messenger make his journey, when the day is 16 houres long.

Likewise when the Bushell of wheat doth cost 3 shillings, the peny loaf of bread weigheth 4 lib.

I demand what the same peny loaf shall weigh

weigh when the bushell of wheat is worth but 2 shillings? Here is to be considered, that the better cheape that the wheat is, the heavier shall the peny loaf weigh, and therefore write down your three numbers thus:

Shil.	Lib.	Shil.	
2.	4.	2.	
	3.		xx Lib.
	12.		x (6.

Then multiply 4 lib. which is the second number, by the first number 3, and they make 12 the which 12 you shall divide by the the third number 2, and thereof commeth 6 li. and so much must the peny loaf of bread weigh, when the bushell of wheat is worth but 2 s. as may appeare. And now according to my former promise, shall follow the second part of Arithmetick, which teacheth the working by Fractions.

Here endeth the first part of Arithmetick.

The second part of Arithmetick, which treateth of Fractions or broken Numbers

Chap. 1.

Of Fractions or broken numbers and the difference thereof.

A Fraction or a broken number, is as much as a part, or many parts of 1, whereof there are two numbers with a line betwéen them both, that is to say, the one which is above the line, is called the numerator, the other underneath the line, is called the denominator, as by example, 3 quarters is called a fraction, which must be set down thus, $\frac{3}{4}$, whereof 3 which is the higher number above the line is called the numerator, and 4 which is under the line, is called the denominator. And it is alwayes convenient that the numerator be lesse in number than the denominator. For if the numerator, and the denominator

minator be equall numbers, then shall they represent a whole number thus, as $\frac{1}{1}, \frac{2}{2}, \frac{3}{3}$, which are whole numbers, by reason that the numerators of these, and all such like, may be divided by their denominators, and the quotients will allwayes be but 1. But in case that the numerator of any fraction doe exceed his denominator, then it is more then one whole: as $\frac{29}{18}$ is more than a whole number by $\frac{11}{18}$. and this is properly called an improper fraction: other definition doth not hereunto appertaine. Furthermore it is to be understood, that when the numerator is just the halfe of the denominator, then the same broken number is the just halfe of one whole, as $\frac{6}{12}, \frac{7}{14}, \frac{8}{16}, \frac{9}{18}$, and the other like are the halfes of one whole number whether it be of money, of measure, of weight, or any other thing: whereof doth grow and come forth 2 progressions naturall: the one proceeding by augmenting or increasing, as these:

$\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9}, \frac{9}{10}$, &c.

And they doe proceed infinitely, and will never reach to make a whole number, thus $\frac{1}{1}$. And the other progression, doth progredy by diminishing or decreasing as thus:

$\frac{1}{3}, \frac{1}{3^2}, \frac{1}{3^3}, \frac{1}{3^4}, \frac{1}{3^5}, \frac{1}{3^6}, \frac{1}{3^7}, \frac{1}{3^8}, \frac{1}{3^9}, \frac{1}{3^{10}}$, &c.

And these doe proceed infinitely, and shall never come to make a 0, which signifieth nothing, but shall ever retaine some certaine value of an unity, whereby it doth appeare that fractions or broken numbers are infinite.

Chap. 2.

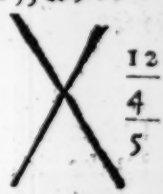
Of the reducing or bringing together of 2 Fractions, or many of divers denominations, unto fractions of one like denomination.

Reduction, is as much as to reduce and bring together, or to put 2 or many nũbers, being of divers denominations the one from the other, into Fractions of one denomination, in reducing them unto a common denominator, & the reason hereof is, For because the diversity & difference of the broken numbers do come of the denominators part, or of divers denominators, and for the understanding hereof, there is a generall rule whose operation or working is thus: Multiply the denominators of the fractions, the one by

the other, and so you shall have a new denominator common to all the fractions, the which denominator you must divide by the particular denominators of every of the said fractions, and multiply every quotient by his owne numerator, and so you shall have new numerators, for the numbers which you would reduce, as appeareth by this example following.

Reduction in common denomination.

1 If you will reduce $\frac{2}{3}$ and $\frac{4}{5}$ together, first make a crosse betwæn the 2 fractions as here you see, and then you must multiply the two denominators the one by the other, as thus, 3 by 5 maketh 15, which is your common denominator: set that under the crosse, then divide 15 by the denominator 3, and you shall have 5, which multiply by the numerator 2, and you shall finde 10, set that over the $\frac{2}{3}$, and they are $\frac{10}{15}$ for the $\frac{2}{3}$ Afterwards divide 15 by the dominator 5 and thereof commeth 3, the which multiply by the numerator 4, and you shall



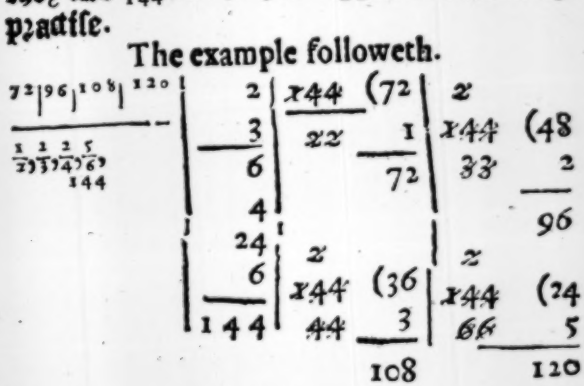
finde 12, which set over the head of the $\frac{4}{5}$ & they make $\frac{12}{15}$ for the $\frac{4}{5}$: as appeareth more plainer above in the margent.

2 If you will reduce $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$, together, you must multiply all the denominators the one by the other, that is to say, 2 by 3 maketh 6: then 6 by 4 amounteth to 24. Last of all, 24 by 6, and thereof commeth 144, for the common denominator. Then for the first fraction which is $\frac{1}{2}$ divide 144 by the denominator 2, and thereof commeth 72, the which multiply by the numerator 1, & it is still 72, set that over the $\frac{1}{2}$ & that is $\frac{172}{144}$, for the $\frac{1}{2}$ Then divide 144 by the second denominator 3, and thereof commeth 48 the which multiply by the second numerator 2, and they are 96, which set over the $\frac{2}{3}$, and they make $\frac{96}{144}$, for the $\frac{2}{3}$: Then divide 144 by the third denominator 4, and thereof commeth 36, the which multiply by the third numerator 3, and they make 108 which set over the $\frac{3}{4}$ and they are $\frac{108}{144}$, for the $\frac{3}{4}$.

Finally divide 144 by the last denominator 6, & thereof commeth 24: the which multiply by the last numerator 5, & thereof commeth 120 which set over the $\frac{5}{6}$ and they

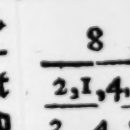
they are $\frac{120}{144}$ of the $\frac{5}{6}$ as appeareth here by practise.

The example followeth.



Reduction, of broken numbers of broken.

IF you will reduce the broken of broken together, as thus, the $\frac{2}{3}$ of $\frac{1}{4}$, of $\frac{4}{5}$, you must multiply all the numerators, the one by the other to make one broken number of the three broken numbers: that is to say, 2 by 1, maketh 2: and then 2 by 4, maketh 8, which 8 is your numerator. Then multiply the Denominators the one by the other, that is to say, 3 by 4, maketh 12, and then 12 by 5, maketh 60, for your denominator, set 8 over 60, with a line between them, and they be



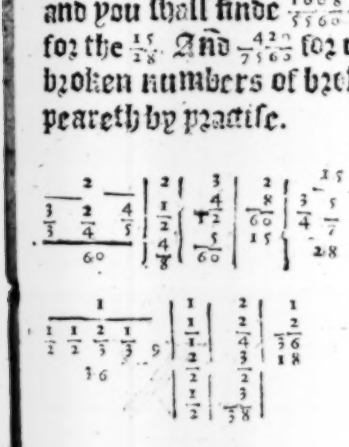
be $\frac{8}{60}$ which being abrevied are $\frac{2}{15}$, and so much are the $\frac{2}{3}$, of $\frac{1}{4}$, of $\frac{4}{5}$, as appeareth in the margent.

Another example of the same Reduction, And of the second Reduction.

IF you will reduce $\frac{2}{3}$ of $\frac{1}{4}$, of $\frac{4}{5}$, the $\frac{3}{4}$ of $\frac{5}{7}$: And the $\frac{1}{2}$, of the $\frac{1}{2}$, of the $\frac{2}{3}$ of $\frac{1}{3}$, First it behoveth you of every party of the broken numbers, to make of each of them one broken, as by the third Reduction is taught: that is to say, in multiplying the numerators by numerators, and denominators by denominators: First, for the first part which is $\frac{2}{3}$ of $\frac{1}{4}$, of $\frac{4}{5}$, you must as is before said multiply 2 by 1, and then by 4, and you shall have 8 for the numerator: likewise multiply 3 by 4, and the product by 5, and you shall have 60 for the denominator: so they make $\frac{8}{60}$ which being abrevied are $\frac{2}{15}$, for the first part, that is to say, for the $\frac{2}{3}$ of $\frac{1}{4}$: secondly for the $\frac{3}{4}$ of $\frac{5}{7}$, multiply likewise the numerator 3 by 5, maketh 15 for the numerator. And multiply 4 by 7, maketh 28, for the denominator. And then they be $\frac{15}{28}$ for the second part: that is

to

to say, for the $\frac{3}{4}$ of $\frac{5}{7}$. Thirdly, for the $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{2}{3}$, of $\frac{1}{3}$ you must multiply the numerators the one by the other, that is to say, 1 by 1, and then by 2, and last by 1, and all maketh but two for the numerator: likewise multiply the denominators 2 by 2, maketh 4 and 4 by 3 maketh 12, and then 12 by 3 maketh 36, for the denominator: and they are $\frac{2}{36}$ which being abbrevied maketh $\frac{1}{18}$, for the third part; that is to say, for $\frac{1}{2}$ of the $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{1}{2}$. Last of all, take the $\frac{2}{15}$ the $\frac{15}{28}$, and $\frac{1}{18}$, and reduce them according to the order of the second reduction, and you shall finde $\frac{1008}{5560}$ for the $\frac{2}{15}$. And $\frac{450}{7560}$ for the $\frac{15}{28}$. And $\frac{420}{7560}$ for the $\frac{1}{18}$, and thus are broken numbers of broken reduced, as appeareth by practise.



1008

1008	4050	420
$\frac{2}{25}$,	$\frac{15}{28}$,	$\frac{1}{18}$

7560

15	202		15	
28	7560	(508	390	
120	1555	2	7560	(270
30	11	1008	2888	15
420			22	1350
18				270
3360				4050
420				
7560				

1
330
7560 (420
1888 1
11 420

Reduction of broken numbers, and the parts of broken together.

If you will reduce $\frac{1}{2}$, and the $\frac{1}{3}$ of $\frac{1}{2}$, together, to bring them into one broken number, you must first set downe the $\frac{1}{3}$ and $\frac{1}{2}$, as appeareth in the margent with a crosse betwéene them, & then multiply the two denominators, the one by the other, that is to say, 2 by 3 maketh 6,

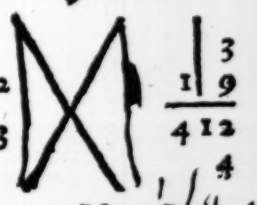
3

$\frac{1}{3}$ X $\frac{1}{2}$

6

set

set that under the crosse, then multiply the first numerator 1, by the last denominator 2, and that maketh 2, unto the which adde the last denominator 1, and they be 3, which set above the crosse, so shall you find the $\frac{1}{3}$ and the $\frac{1}{2}$ of $\frac{1}{3}$, do make $\frac{3}{6}$ which being abreuied doth make $\frac{1}{2}$, which is as much as the $\frac{1}{3}$ and the $\frac{1}{2}$ of $\frac{1}{3}$, being reduced into one fraction. Likewise if you will reduce the $\frac{2}{3}$ and the $\frac{1}{4}$ of $\frac{1}{3}$, you must doe as before, set downe the $\frac{2}{3}$ and $\frac{1}{4}$, with a crosse betweene them, then multiply the denominators the one by the other that is to say 3, by 4, maketh 12: which set under the crosse, as you see in the margent: and then multiply the first numerator 2, by the last denominator 4, and thereof commeth 8, whereunto adde the last numerator 1 and that maketh 9, which 9 set over the crosse: so shall you finde that the $\frac{2}{3}$ and the $\frac{1}{4}$, of $\frac{1}{3}$, are worth $\frac{9}{12}$, the which abreuied do make $\frac{3}{4}$ as appeareth by example in the margent.



Reduction

Reduction of whole Numbers and broken together in a Fraction, the which fraction is called an improper fraction.

IF you will reduce whole Number and broken into broken, you shall reduce the whole number into broken as by this example may appeare: if you will reduce 17 $\frac{5}{8}$ into a broken number, first you must multiply the whole number 17 by the denominator of the broken, which is 8, in saying 8 times 17. doe make 136, unto the which you must adde the numerator of $\frac{5}{8}$ which is 5, and all amounteth to 141. which set over $\frac{5}{8}$, with a line between them, and they will be $\frac{141}{8}$ so much is 17 $\frac{5}{8}$ worth in an improper fraction, as appears here by practise.

17	141	
8	$17\frac{5}{8}$	
136		maketh $\frac{141}{8}$
5		
141		

In case you have whole numbers and broken to be reduced with broken, you must bring the whole number into his broken, in multiplying it by the denominator of the pro-

broken number going therewith, and adde thereunto the numerator of the said broken number, as in the last example is declared, and then reduce that broken number with the other broken as here appeareth by this example. Reduce $10\frac{2}{3}$ and $\frac{4}{7}$ together, first bring $10\frac{2}{3}$ all into thirds as it is taught by the first Reduction, and you shall finde $\frac{32}{3}$, then reduce the $\frac{32}{3}$ and $\frac{4}{7}$ together by the first reduction, and you shall finde $\frac{224}{21}$, for the $\frac{32}{3}$: and $\frac{12}{21}$ for $\frac{4}{7}$ as appeareth here by practise.

$\frac{32}{10\frac{2}{3}}$ | $\frac{224}{\frac{32}{3}}$

12. 32. 4.

$\frac{4}{7}$ 7. 3.

21 224 12.

Also in case you have in both parts of your reduction, as well whole numbers as broken, you must allwayes put the whole of each part into his broken as by the 6 Reduction is taught.

Example.

If you will reduce $12\frac{2}{4}$ with $14\frac{2}{3}$, to bring them into one denomination, first bring the $12\frac{1}{4}$ all into fourths, and you shall finde $\frac{42}{4}$: then likewise reduce $14\frac{2}{3}$, all into thirds

thirds, and you shall have $\frac{44}{3}$, for the $14\frac{2}{3}$: then reduce $\frac{49}{4}$, and $\frac{44}{3}$ together, by the order of the first reduction, and you shall find $\frac{147}{12}$, for the $\frac{49}{4}$, And $\frac{176}{12}$ for the $\frac{44}{3}$: as here by practice both plainly appeare.

$$\frac{49}{12\frac{1}{3}} \quad \frac{44}{4\frac{2}{3}} \quad \frac{147}{4\frac{9}{4}} \qquad \frac{176}{\frac{44}{3}}$$

12

Chap. 3.

Of Abbreviation of one broken number into a lesser broken.

Abbreviation is as much as to set downe, or to write a broken number by figures of lesse signification, and not diminishing the value thereof. The which to doe, there is a rule whose operation is thus, divide the numerator, and likewise the denominator, by one whole number, the greatest that you may finde in the same broken number, and of the quotient of that nu-

numerator, make it the enumerator, and likewise of that of the denominator, make it your denominator, as by example.

1 If you will abbreviate $\frac{4}{81}$ you shall understand that the greatest whole number that you may take, by the which you may divide the numerator and the denominator is 27, which is the half of the denominator, and that is a whole numbeer, for you cannot take a whole number out of the denominator 81 which will divide both the numerator and the denominator, but that there will be either more or lesse then a whole number, therefore if you divide 54. by 27, you shall finde in the quotient 2 for the numerator: likewise if you divide 81 by 27 you shall have in the quotient 3 for the denominator: then put 2 over the 3, with a line between them, and you shall finde $\frac{2}{3}$,

$$\frac{4}{81}$$

$$\begin{array}{l} 27 \\ 54\ (3 \\ 27 \end{array}$$

$$\frac{2}{3}$$

and thus by this rule the $\frac{20}{81}$ are abbrevied unto $\frac{2}{3}$: as apeareth in the margent, and so is to be understanded of all other.

20 | 81 (3
27

The form and manner how to find the greater number, by the which you may wholly divide the numerator and denominator (to the end ye may abreviate them) is thus.

FIrst, divide the denominator by his numerator, and if any number do remain, let your divisor be divided by the same number, and so you must continue until you have so often times divided that there may nothing remain, then it is to be understood, that your last divisor (whereat you did end, and that did remain after your last division) is the greatest number, by the which you must abbreviate, as you did in the last example. But in case that your last divisor be 1, it is a token that the

the same number cannot be abbreviated to any lower fraction then you finde it at the first. Example of $\frac{54}{81}$ divide 81, which is the denominator by 54 which is his numerator, and there resteth 27, then divide 54 by 27, and there remaineth 10, which is nothing, wherefore your last divisor 27 is the number by the which you must abbreviate $\frac{54}{81}$: as in the last example is specified.

Another manner of Abbreviation.

2 Mediate the numerator, and also the denominator of your Fraction in, case the numbers be even, that is to say, take always the half of the numerator, and likewise of the denominator, and of the mediation or halfe of the numerator, make it your numerator, also of halfe the denominator make your denominator, and so continue as often as you may in taking alwayes the halfe of the numerator, and likewise of the denominator: or else see if you may abbreviate the numbers which do remain by 3, by 4, by 5, 6, 7, 8, 9, or by 10: for you must abbreviate them as often as you can by any of the said numbers. And it is to be noted, that with whatsoever number of these, you doe abbreviate the numerator

of your fraction, by the same you must abbreviate likewise the denominator, so continuing until they can no more be abbrevied. And it is to be understood, that if the Numerator and the Denominator be even numbers, as you may know when the first figure is an even number, or a 0, then may you perceive if both the Numerator and the Denominator may be abbrevied by 10, by 8, by 4, or by 2: albeit that sometimes they may be abbrevied by 3. And if they be odde numbers, then must you consider if they may be abbrevied by 9, by 7, by 5, or by 3: but when the first number as well of the numerator, as of the denominator are even numbers, then may you well know that such numbers may be abbrevied by 2 as is aforesaid. And if you adde the figures of the numerator together, in such manner as you doe in making the proofe by 9 in whole numbers, that is, if you finde it appeareth that you may abbrevie that number by 9, and likewise by 3, and sometimes by 6, if you finde 6 it may be abbrevied by 6, and alwaies by 3, if you finde 3; it is a sign that you abbreviate by 3. And by whatsoever number that you doe abbreviate the numerator, by the same must you

abbreviate likewise the denominator, and if the first figures of the same number be 5 or 0, you may abbreviate them by 5, but if the first figures be both 0, they may be abbreviated by 10: in cutting away the 2 Ciphers thus, as $\frac{20}{30}$ which maketh $\frac{2}{3}$, and sometimes by 100, thus, as $\frac{100}{200}$, in cutting away the four Ciphers after this sort, $\frac{100}{200}$ and then $\frac{100}{200}$ doe make $\frac{1}{2}$, and after this manner have I set here divers examples, although that all broken numbers cannot be abbreviated by this rule, yet all fractions may be well abbreviated by the first rule aforesaid.

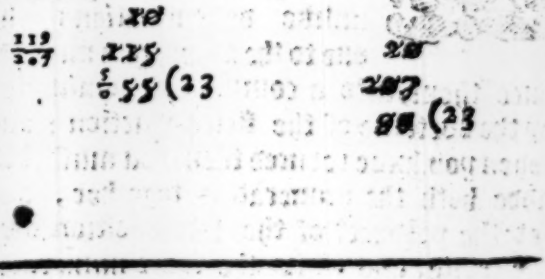
Abbreviated.

$\frac{3810}{7620}$ by 10.	$\frac{1890}{4795}$ by 9.
$\frac{384}{768}$ by 8,	$\frac{210}{315}$ by 7.
$\frac{48}{96}$ by 6.	$\frac{30}{75}$ by 5.
$\frac{8}{16}$ by 4.	$\frac{6}{15}$ by 3.
$\frac{4}{8}$ by 2.	$\frac{2}{5}$
$\frac{1}{9}$	

3 Furthermore you shall understand that sometimes it happeneth that all the figures of the numerator are equall unto them of the denominator, which when it so happeneth you may then take one of them of the numerator, and also one of them of the denominator, and it shall be abbreviated as $\frac{555}{888}$ being abbreviated after this manner cometh to $\frac{5}{8}$. And yet it happeneth sometimes, that two or many figures of the numerator are proportioned unto 2 or many figures of their denominators, and that the other figures of the same number are the figures one to the other in this proportion following. Then may you take two or more figures, as well of the numerator as of the denominator, and by this manner the same number shall be abbreviated, as $\frac{4747}{5255}$ being abbreviated by this rule, doe come to $\frac{47}{49}$.

4 Also it happeneth sometimes, that you would abbreviate one number unto the semblance or likenesse of another: And for to know if the same may be abbreved, and also by what number it may be abbrevied, you must divide the numerator of one number by the numerator of the other: and likewise the denominator of the one, by the denominator of the other, so

in case that after every division there doe remain 0, and that the two quotients be equall, then is one of them the number by the which the said fraction must be abbrevied, as by example of $\frac{115}{207}$ I would know if they may be abbrevies unto $\frac{5}{9}$, and for to do this you must divide 115 by 5, and you must divide 207 by 9, and there will come into both the quotients 23: by the which it appeareth that this number may be abbrevied by 32.

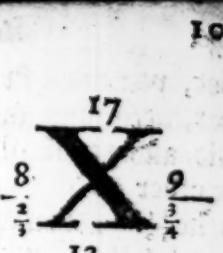


The fourth Chapter treateth of the adding of two or many broken numbers together, as by Example.

FOr to adde Fractions or broken numbers together, there is a generall rule which is thus. If the numbers be of unlike denominations the one to the other, you must reduce them into a common denomination by the doctrine of the first reduction: and when you have reduced them you must then adde both the numerators together, and set the product of the said addition over the crosse, and divide the same numerator by the common denominator, as by this example following.

1 If you will adde $\frac{2}{3}$ with $\frac{1}{4}$, you must first reduce the two o fractions both into one denomination, according to the order of the first reduction, that is to say, in multiplying the denominator of the first fraction which is 3, by the Denominator of

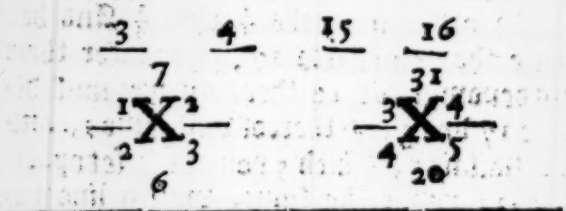
of the other fraction which is 4, & they make 12 for your common denominator: the which 12 you shall set under the crosse, then multiply the first numerator 2 by the last denominator 4, and thereof cometh 8 which set over the $\frac{2}{3}$ and then multiply the last numerator 3, by the first denominator 3, and thereof cometh 9, which you must set over the $\frac{3}{4}$: then adde the numerator 8, with the numerator 9, and they make 17, which set over the crosse, and then your fraction will be $\frac{17}{12}$: which is the addition of the $\frac{2}{3}$ with $\frac{3}{4}$. And because the numerator 17, is greater then his denominator 12 therefore you must divide 17 by 12 and thereof will come 1, and 5 remaining, which 5 you must set apart, and 12 under the same, with a line between them, and they are worth $1\frac{5}{12}$, and so much are the $\frac{2}{3}$ added with $\frac{3}{4}$ as both appears.



Addition in broken numbers.

3 Also if you will adde $\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ and $\frac{4}{5}$ together,

ther, you must first adde the $\frac{1}{2}$ and $\frac{2}{3}$, together, according to the doctrine of the last rule, and you shall find $\frac{7}{6}$ then adde $\frac{3}{4}$ and $\frac{4}{5}$ together by the said last rule, and they make $\frac{31}{20}$. Then finally adde the $\frac{7}{6}$ (which came of the $\frac{1}{2}$ and $\frac{2}{3}$ added together) with $\frac{31}{20}$, which came of the $\frac{3}{4}$ and $\frac{4}{5}$ added together) and you shall finde by the aforesaid addition that they amount unto $\frac{326}{120}$. Wherefore divide 326 by 120 and thereof cometh 2, and 86 remaineth which is $\frac{86}{120}$ of one whole, and they being abbrevied doe make $\frac{43}{60}$ and thus the $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{4}{5}$ being added together doe amount to 2 and $\frac{43}{60}$ as here under doth appeare.



Ad-

Addition of broken numbers of broken.

3 Furthermore, if you will adde the broken numbers of broken together, as to adde the $\frac{2}{7}$ of $\frac{3}{4}$ of $\frac{4}{5}$ with the $\frac{5}{6}$ of $\frac{1}{2}$ of $\frac{5}{8}$: first you must reduce the number according to the order of the fourth reduction, in multiplying the numerators of the first 3 fractions, the one by the other, and of the product make your numerator, and likewise you must multiply the denominators of the foresaid three fractions, the one by the other, and of the product make your denominator, and you shall finde $\frac{24}{60}$ for the first three broken numbers, the which being abbrevied doe make $\frac{2}{5}$ then reduce the other three fractions, by the said fourth reduction, in multiplying the numerators by numerators, and denominators by denominators, as you did by the first three broken numbers aforesaid, and you shall finde $\frac{25}{90}$ then must you adde the $\frac{2}{5}$ which came of the first 3 broken numbers, and $\frac{25}{90}$ which are come of the last three fractions, both together, by the instruction of the first Addition: and you shall finde $\frac{317}{480}$: which cannot be abbrevied, but is the just product of the addition: so much are $\frac{2}{3}\frac{3}{4}$ of $\frac{4}{5}$ added with the $\frac{5}{6}$ of $\frac{1}{2}$ of

$\frac{5}{8}$

$\frac{5}{8}$, as hereafter by practise doth evidently appeare.

$$\frac{24}{\frac{2}{3},\frac{3}{4},\frac{4}{5},} \qquad \frac{25}{\frac{5}{6},\frac{1}{2},\frac{5}{8},}$$

$$60 \qquad \frac{2}{5} \qquad 96$$

$$317$$

$$192 \qquad 125$$

$$\frac{2}{5} \quad \times \quad \frac{25}{96} \qquad \frac{317}{480}$$

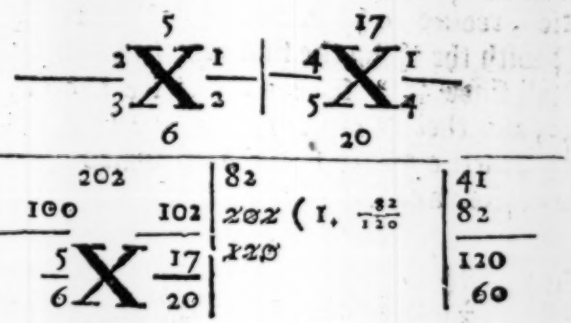
$$480$$

Addition of broken numbers and parts of broken, with broken, and the parts of broken together.

4. Likewise if you will adde the $\frac{2}{3}$ and the $\frac{1}{2}$ of $\frac{1}{3}$ with the $\frac{4}{5}$ and $\frac{1}{4}$ of $\frac{1}{5}$, you must reduce the $\frac{21}{32}$ first into one fraction by the doctrine of the fift reduction, and thereof cometh $\frac{5}{6}$, for the $\frac{2}{3}$ and $\frac{1}{2}$ of the said thirds: then reduce the $\frac{4}{5}$ and $\frac{1}{4}$ by the said fift reduction, and thereof cometh $\frac{17}{20}$.

Last of all adde, the $\frac{5}{6}$ and $\frac{17}{20}$ together according to the first rule of Addition: and you shall finde $\frac{301}{120}$ which being divided bringeth

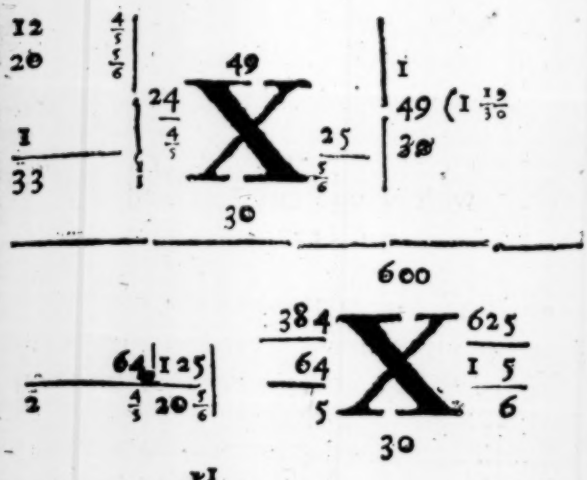
bringeth 1, & $\frac{82}{120}$ parts remaining, which abbreuiated maketh $\frac{41}{60}$ and thus you doe perceiue that the $\frac{2}{3}$ and $\frac{1}{2}$ of $\frac{1}{3}$, added with the $\frac{4}{5}$ and $\frac{1}{4}$ of $\frac{1}{5}$, doe amount unto 1 $\frac{41}{60}$, as hereafter by practice both plainly appeare.



Addition of whole numbers and broken with whole numbers and broken.

5 Alſo if you will adde 12 $\frac{4}{5}$ with 20 $\frac{5}{6}$ you may (if you will) adde 12 and 20 together, and they make 32, the which you ſhall ſet apart and then adde the two broken numbers together, that is to ſay $\frac{4}{5}$ and $\frac{5}{6}$ by the order of the firſt addition, and they make $\frac{49}{30}$: therefore diuide 49 by 30 and thereof commeth 1 and $\frac{19}{30}$ parts remain, which

which 1 you muſt adde unto the 32, which were put apart, and the whole addition will be $33\frac{19}{30}$. Or otherwiſe, you may reduce $12\frac{4}{5}$ into the likeneſſe of a Fraction by the order of the ſixth reduction, and they will be $\frac{64}{5}$ and likewiſe by the ſame reduction, reduce $20\frac{5}{6}$ and they be $\frac{125}{6}$ then adde $\frac{64}{25}$ with the $\frac{25}{6}$, by the firſt addition, and you ſhall finde $\frac{1009}{30}$. Therefore divide 1009 by 30, and thereof cometh $33\frac{19}{30}$ as before, as by practiſe of the ſame both waies both hereafter apeare.



The

The fift Chapter treateth of Substraction in broken numbers.

1 If you will substract $\frac{2}{3}$ from $\frac{3}{4}$, you must first reduce both the fractions into a common denomination, by the doctrine of the first reduction, and you shall finde $\frac{4}{12}$ for the $\frac{2}{3}$ and $\frac{9}{12}$ for the $\frac{3}{4}$. Therefore abate the numerator 8 from the numerator 9, and there will remaine 1, which 1 you must set over the crosse, and the same is $\frac{1}{12}$ and so much is the rest of that substraction, as may appear here by practise.

$$\frac{8}{} \quad \frac{9}{}$$

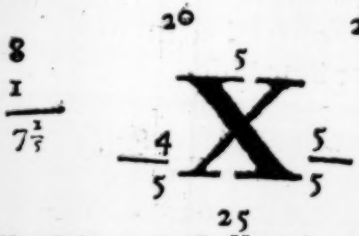
$$1$$

$$\frac{1}{2} \times \frac{3}{4}$$

$$12$$

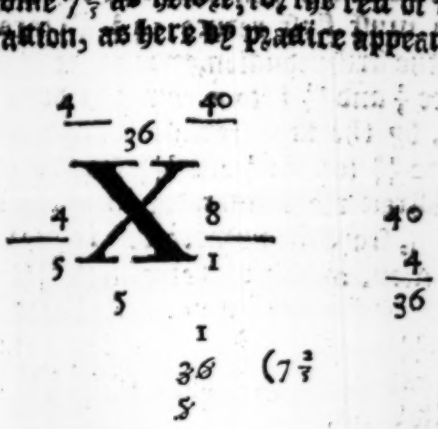
2 But if you have a broken number to be substracted from a whole number, you must borrow 1 unit of the whole number, and resolve it into a fraction of like denomination, as is that fraction, which you would abate from the same whole number, and then abate the said fraction therefrom, and you shall finde what doth remain, as by this example. If you abate $\frac{4}{5}$ from 8, you must

must borrow one of the said 8, and resolve it into fifties like unto the fraction, because it is $\frac{4}{5}$, & that 1 will be $\frac{5}{5}$ fifts thus $\frac{5}{5}$ therefore abate $\frac{4}{5}$ from $\frac{5}{5}$ and there will remaine $\frac{1}{5}$, and subtract the 1 which you borrowed from 8, and there both remaine 7, and the $\frac{1}{5}$ also which remained after the said $\frac{4}{5}$ were abated. Thus the $\frac{4}{5}$ being subtracted from 8, both leave $7\frac{1}{5}$ as by practise both plainly appeare.



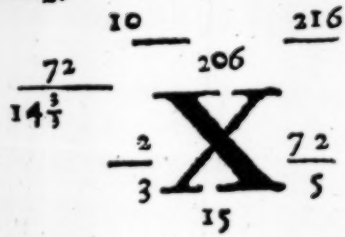
Or otherwise you shall put 1 under 8 with a line betweene, and that will be $\frac{8}{1}$: then set downe the $\frac{4}{5}$ and the $\frac{8}{1}$ with a crosse betweene them, then you must reduce them into one denomination by the first reduction, and you shall finde 4 over the $\frac{4}{5}$ and 40 over the $\frac{8}{1}$, then subtract the said 4 from 40, and there will remain 36, the which you shall set over the crosse, and they doe make $\frac{36}{5}$ Likewise you must multiply the denominator 5 by 1, maketh 5, set that under the crosse, then divide 36 by 5, and the roof will

will come $7\frac{2}{3}$ as before, for the rest of that substraction, as here by practice appeareth.



3. If you will substract broken numbers from whole numbers and broken: as if you would substract $\frac{3}{4}$ from $6\frac{5}{6}$, you may by the first substraction abate $\frac{3}{4}$ from $\frac{5}{6}$ and there will remain $\frac{1}{12}$, and the 6 both still remain whole, because the $\frac{3}{4}$ may well be abated from the $\frac{5}{6}$ and thus $\frac{3}{4}$ being abated from $6\frac{5}{6}$ leaveth $6\frac{1}{12}$ as appeareth by practise.

Likewiſe if you will abate $\frac{2}{3}$ from $14\frac{2}{5}$, you muſt firſt reduce $14\frac{2}{5}$ all into fifths, by the firſt reduction, and they be $\frac{72}{5}$ then reduce $\frac{2}{3}$ and $\frac{72}{5}$ into a common denomination, by the firſt reduction, and you ſhall finde $\frac{10}{15}$ for the $\frac{2}{3}$ and $\frac{216}{15}$ for the $\frac{72}{5}$: then ſubſtract the numerator 10 of the firſt fraction, from the numerator 216 of the ſecond fraction, and there remaineth $\frac{206}{15}$. Therefore divide 106 by 15, and thereof cometh $13\frac{11}{15}$, and ſo much remains of this Subſtraction, as may appeare in the example following,



1
21
25
206 (13 11/15
255
1

4. If you will ſubſtract whole numbers and broken from whole and broken, as thus

thus, if you will subtract $9\frac{1}{4}$ from $20\frac{1}{2}$, you must reduce $9\frac{1}{4}$ into fourths, and likewise the $20\frac{1}{2}$ into halfes, by the firth reduction: and you shall find $\frac{37}{4}$ for the $9\frac{1}{4}$: and $\frac{41}{2}$ for the $20\frac{1}{2}$. Then reduce $\frac{37}{4}$, and $\frac{41}{2}$ into one denomination, according unto the first reduction and you shall finde $\frac{74}{8}$ for the $\frac{37}{4}$, and $\frac{164}{8}$ for the $\frac{41}{2}$, then abate the numerator of $\frac{74}{8}$ which is 74, from 164 which is the numerator of $\frac{164}{8}$ and there remaineth $\frac{90}{8}$, then divide 90 by 8, and thereof comth $11\frac{1}{4}$ which is the remainer of this subtraction.

37	41
$9\frac{1}{4}$	$20\frac{1}{2}$

74	164
90	
37	41
4	2
8	

364	xz	
74	88	($11\frac{1}{4}$
90		

Substraction of broken Numbers of broken, from Fractions of Fractions.

5. If you will substract the $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{5}$ from the $\frac{5}{6}$ of $\frac{3}{4}$ of $\frac{7}{8}$, you must first bring the $\frac{1}{2}$ of $\frac{2}{3}$ into one Fraction, by the third reduction: and the $\frac{5}{6}$ of $\frac{3}{4}$ of $\frac{7}{8}$, likewise into one Fraction by the same reduction, and you shall finde $\frac{6}{30}$ for the first three broken numbers, which being abbrevied doe make $\frac{1}{5}$: and for the other three broken Numbers, you shall finde $\frac{105}{192}$: which being likewise abbrevied, doe make $\frac{35}{64}$ then you shall substract $\frac{1}{5}$ from $\frac{34}{64}$ by the instruction of the first Substraction in reducing both the Fractions into a common denomination, as before is done, and you shall finde remaining $\frac{111}{320}$ as may appear by example.

	6				105	
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{5}$		$\frac{5}{6}$	$\frac{3}{4}$	$\frac{7}{8}$
	30		$\frac{1}{5}$		192	$\frac{35}{64}$
	64		175			

111

$\frac{1}{5}$ X $\frac{35}{64}$ — 175 / 64 / 111

320

The

The sixth Chapter is of Multiplication in broken Numbers.

FIrst for to multiply in broken numbers there is a rule, which is thus, you must multiply the numerator, of the one Fraction, by the numerator of the other. And likewise you must multiply the Denominator of the one by the Denominator of the other. And then divide the Fraction if it may be divided, or else abbreviate it, if it may be abbreviated, and it is done. But if there be whole numbers and broken together, you must reduce the whole numbers into their broken, and adde thereunto the Numerator of his broken, and then multiply, as it is before said, as also hereafter by examples shall more plainly appeare.

1. If you will multiply $\frac{2}{3}$ by $\frac{3}{4}$, you must multiply the Numerator 2 by the Numerator 3, and thereof cometh 6 for the Numerator. Likewise you must multiply the denominators the one by the other, that is to say, 3 by 4, and thereof cometh 12 for the Denominator: so that this multiplication cometh to $\frac{6}{12}$ which being

abbreuied doe make $\frac{1}{2}$: and so much amounteth the multiplication of the $\frac{2}{3}$ by $\frac{3}{4}$ as by practice appeareth.

6 — 1

$\frac{2}{3}$ — $\frac{3}{4}$

12

2. Likewise if you will multiply a broken number by whole numbers, or whole numbers by broken, which is all one, as $\frac{4}{5}$ by 18, or else 18 by $\frac{4}{5}$. you must set 1 under 18 thus, $\frac{18}{1}$: and then multiply the numerator 18, by the numerator 4, and thereof cometh 72. Likewise multiply the Denominator 5, by the denominator 1, and thereof cometh 5, then divide 72 by the denominator 5, and thereof cometh $14\frac{2}{5}$: for the whole multiplication. Or otherwise, abate from 18 his $\frac{1}{5}$ part, which is $3\frac{3}{5}$ and there remaineth $14\frac{2}{5}$, as hereafter followeth.

72 — 2

$\frac{4}{5}$ — $\frac{18}{1}$ 72 (14 $\frac{2}{5}$

5 5

Otherwise

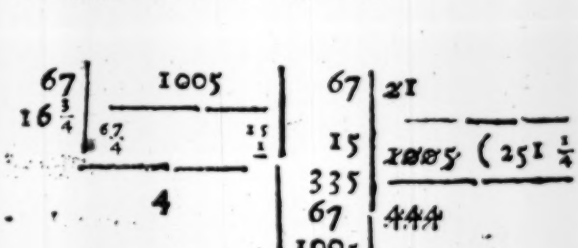
18 — 3 18

$\frac{10}{1}$ — $\frac{1}{5}$ 18 (3 $\frac{1}{5}$ 3 $\frac{3}{5}$

15 5 14 $\frac{2}{5}$

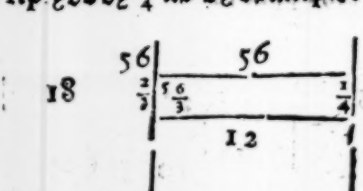
3. Also

3. *Also if you will multiply a whole number, by whole numbers and broken, or else whole number and broken by a whole number which is all one, as by example: if you will multiply 15 by 16 $\frac{3}{4}$, or else 16 $\frac{3}{4}$ by 15: First, reduce 16 $\frac{3}{4}$ all into fourths, multiplying 16 by the Denominator of $\frac{3}{4}$ which is 4, and thereof cometh 64, whereunto adde the Numerator 3, and it maketh $\frac{67}{4}$: which multiply by $\frac{15}{1}$ according to the instruction of the last example, and you shall finde the Product of this Multiplication to be 251 $\frac{1}{4}$, as by following practise doth appeare.*



4. *And if you will multiply a broken number by whole numbers and broken, or else whole numbers and broken by a broken: As by example, if you will multiply $\frac{1}{4}$ by 18 $\frac{2}{3}$, or else 18 $\frac{2}{3}$ by $\frac{1}{4}$, which is all one:*

you must reduce the whole number into his broken by the fifth reduction. And you shall finde $\frac{56}{1}$, which you shall multiply by the $\frac{1}{4}$ after the Doctrine of the first Multiplication, that is to say; in multiplying the Numerator 56 by the Numerator $\frac{1}{4}$, which is 1: and it is still 56, because 1 doth neither multiply nor divide. And likewise you must multiply the Denominator 3, by the Denominator, 4 and it maketh 12: then divide 56 by 12, and thereof cometh $4\frac{2}{3}$. And so much amounteth the multiplycation of the said $18\frac{2}{3}$ multiplyed by $\frac{1}{4}$ as by example.



5. If you will multiply whole numbers and broken, with whole and broken, you must first put either whole numbers into his broken, according to the instruction of the fifth reduction, and then multiply the one numerator by the other, and of the Product make your numerator. And likewise multiply the Denominators the one by the other, and thereof make the De-

Denominator, then divide the Numerator by the Denominator, and the quotient shall be the encrease of this Multiplication. Example. If you would multiply $12\frac{4}{5}$ by $6\frac{3}{4}$: first by the first reduction the $12\frac{4}{5}$ will make $\frac{64}{5}$: and the $6\frac{3}{4}$ will make $\frac{27}{4}$, then multiply the Numerator 64, by the Numerator 27, and thereof cometh 1728 for the Numerator. And then you must multiply the Denominator 5, by the Denominator 4, and they doe make 20: then divide 1728, by 20, and thereof cometh $86\frac{2}{5}$ for the whole Multiplication: as by example.

1728		64	
64	27	27	x
$12\frac{4}{5}$	$6\frac{3}{4}$	448	1728
		128	xxx $(86\frac{2}{5}$
20		1728	

6. If you will multiply one broken number by many broken numbers thus: As to multiply $\frac{2}{3}$ by $\frac{5}{7}$ and by $\frac{4}{6}$ you must multiply the Numerators of all the Fractions the one by the other, and of the Product make the Numerator, that is to say,

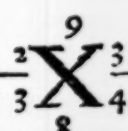
ſay, 2 by 5, and they be 10, then 10 by 4, and they be 40 for the Numerator. Likewiſe you muſt multiply the denominators the one by the other, that is to ſay 3 by 7 maketh 21, then 21 by 9 maketh 189 for the Denominator: then ſet 40 over the 189 with a line betweene them, and they make $\frac{40}{189}$. And ſo much amounteth the whole mutipl ication of the $\frac{2}{3}$ multiplyed by $\frac{5}{7}$ and $\frac{4}{9}$ as by example following. And thus is to be underſtood of all ſuch like.

The 7 Chapter treateth of Diviſion in broken Numbers.

NOte that in Diviſion of broken numbers, you muſt ſet your diviſor down firſt, next unto the left hand, and the dividend or number which is to be divided alwayes toward the right hand,

hand. And then multiply crosselwise, that is to say, the Numerator of your Divisor by the Denominator of the Dividend: and the Product shall be the Denominator, which afterwards shall be your Divisor, and likewise you must multiply the Denominator of your first number, that is to say, of your first Divisor by the Numerator of the Dividend, which afterwards shall be the Dividend, and that must be set over the Crosse, and the Denominator under the Crosse, then divide the Numerator by the Denominator, if it may be divided, if not, you must abbreviate them, as hereafter by examples shall more plainly appeare

1. If you will divide $\frac{1}{4}$ by $\frac{2}{3}$ you must set the Divisor ($\frac{2}{3}$ which is) next to the left hand, and the Dividend $\frac{1}{4}$ toward your right hand, with a crosse betweene them: as may appeare by this example in the margent. Then you shall multiply the numerator of the $\frac{2}{3}$, which is 2 by the Denominator of the $\frac{3}{4}$ which is 4, and thereof cometh 8 which shall be your new Divisor: set



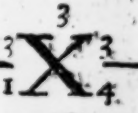
that

that 8 under the Crosse, as the Denominator: then multiply the numerator of the Dividend, that is to say, of the $\frac{3}{4}$ which is 3 by the Denominator of the Divisor, that is to wit, of the $\frac{2}{3}$ which is 3 and thereof cometh 9, set the 9 over the Crosse of the Numerator: which shall be now the devidend or number to be divided. Then finally you shall divide 9, by 8 : and thereof cometh into the quotient $1\frac{1}{8}$, and so oftentimes is $\frac{2}{3}$ contained in $\frac{3}{4}$, as doth appear before in the margent. But in case you would divide $\frac{2}{3}$ by $\frac{3}{4}$, you must likewise set your Divisor $\frac{3}{4}$ next to your left hand as is before said. And then proceed as is above declared, and you shall finde that $\frac{2}{3}$ divided, by $\frac{3}{4}$ bringeth into the quotient $\frac{8}{9}$, which cannot be divided nor abbrevied. Wherefore it appeareth that $\frac{2}{3}$ being divided by $\frac{3}{4}$ bringeth but $\frac{8}{6}$ of one unite into the quotient, as doth appear.

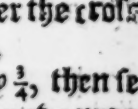
$$\begin{array}{ccc} & 8 & \\ \frac{3}{4} & \times & \frac{2}{3} \\ & 9 & \end{array}$$

2. Likewise

2. Likewise if you will divide a broken number by a whole number, or else a whole number by a broken, as to divide $\frac{3}{4}$ by 13, you shall put 1 under 13, and it will be $\frac{13}{1}$ for your Divisor, set that towards your left hand, and then multiply 13 by 4 according to the first Division, and thereof will come 52, for the Denominator, set that under the crosse, and multiply 3 by one, maketh 3, for the numerator, set that over the cross, and it is $\frac{3}{52}$, as appeareth above.



But if you will divide 13 by $\frac{3}{4}$, then set the $\frac{3}{4}$ next your left hand, and put 1 under 13, as in the last example, and it is $\frac{13}{1}$, set that toward your right hand thus; as appeareth in the margent, and then worke according to the doctrine of the first Division, and you shall finde that 13 being divided by $\frac{3}{4}$ bringeth into the quotient $\frac{52}{3}$, then divide 52 by 3, and thereof commeth $17\frac{1}{3}$, and so oftentimes is $\frac{3}{4}$ contained in 13, as doth appear.



21
52(17 1/3
33

3. And if you will divide whole numbers by whole numbers and broken, or else whole

whole number and broken by whole numbers, as to divide 20 by $5\frac{5}{6}$ you shall reduce $5\frac{5}{6}$ into broken, by the sixth reduction, and it maketh $\frac{35}{6}$ for your divisor, then put 1 under 20, and it will be $\frac{20}{1}$ then shall you multiply 35, by 1, and 20, by 6, as is taught in the other divisions, and you shall find $\frac{120}{35}$: then divide 120 by 35, and you shall find in your quotient 3, and $\frac{15}{35}$, the which $\frac{15}{35}$ being abbreviated, is $\frac{3}{7}$, and so many times is $5\frac{5}{6}$ contained in 20, as in the margent appeareth.

$$\frac{35}{6} \times \frac{20}{1}$$

120

35

1

35

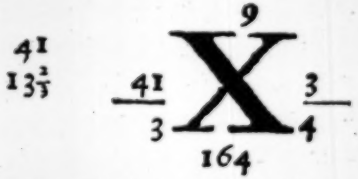
120 (3 $\frac{15}{35}$

35

But if you will divide $5\frac{5}{6}$ by 20, you shall have $\frac{35}{120}$, then you must divide 35 by 120, which you cannot divide, wherefore you shall abbreviate $\frac{35}{120}$, and therefore cometh $\frac{7}{24}$ for your quotient.

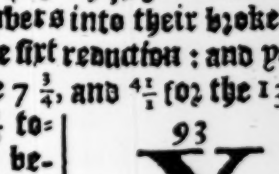
4. If you will divide a broken number, by whole numbers and broken, or else whole number and broken, by a broken number. As to divide $\frac{3}{4}$ by $13\frac{2}{3}$ you must reduce $13\frac{2}{3}$ into his broken, by the first reduction, and they be $\frac{41}{3}$ for your divisor, then multiply 41 by 4. and they make 164 for your denominator, likewise multiply

tiply 3 by 3, and they make 9 for the nu' merator, and then will your summe be $\frac{9}{164}$, as appeareth in the worke here no-



ted. But if you will divide $13\frac{2}{3}$ by $\frac{1}{4}$ then you must divide 164 by 9, and you shall finde $18\frac{2}{9}$.

5. If you will divide whole numbers and broken, by whole numbers and broken, as to divide $7\frac{3}{4}$ by $13\frac{2}{3}$, you must reduce the whole numbers into their broken, by the doctrine of the first reduction: and you shall finde $\frac{31}{4}$ for the $7\frac{3}{4}$, and $\frac{41}{3}$ for the $13\frac{2}{3}$. Then set downe $\frac{41}{3}$ toward the left hand, because it is your divisor, and the $\frac{31}{4}$ towards the right hand, and multiply 41 by 4, for your denominator: and thereof cometh 164. Likewise multiply 31 by 3, for your numerator, and it amounteth to 93 the which will be thus $\frac{93}{164}$ as before both appeare.



But if you will divide $13\frac{2}{3}$ by $7\frac{3}{4}$ you must

must (contrariwise to the other example) divide 164 by 93: and you shall finde in the quotient $1\frac{71}{93}$.

6. The broken numbers of broken must be divided in such manner as broken numbers are, and there is no difference, saving onely that of divers and many broken numbers you must make but two broken numbers, that is to say, the one for the divisor, and the other for the dividend, or number that is to be divided: example If you will divide the $\frac{3}{4}$ of $\frac{3}{5}$ of $\frac{1}{2}$, by the $\frac{2}{3}$ of $\frac{4}{7}$, you must understand, that for the first, the $\frac{3}{4}$ of $\frac{3}{5}$ of $\frac{1}{2}$, are $\frac{9}{40}$ by the third Reduction: and the $\frac{2}{3}$ of $\frac{4}{7}$, are by the same reduction $\frac{8}{21}$, then have you $\frac{8}{21}$ for your divisor, and $\frac{9}{40}$ for your number to be divided, then multiply 8 by 40, which maketh 320, set that under the crosse, and multiply 9 by 21,

189
8 X 9
21 40
320

and thereof commeth 189: which set over the crosse for the numerator, and they make $\frac{189}{320}$ for his division, as both appeare.

But if you would divide $\frac{8}{21}$ by $\frac{9}{40}$, you must worke contrary to the last example, that is to say, you must divide 320 by 189: and thereof commeth in the quotient $1\frac{131}{189}$.

CHAP.

Chap. 8.

Treateth of Duplation, Triplation, Quadruplation of all broken numbers.

IF you will double any broken number, you shall divide the same by $\frac{1}{2}$: likewise if you will triple any fraction, you must divide it by $\frac{1}{3}$. And for to quadruple any broken number, you shall divide it by $\frac{1}{4}$ and so is to be understood of all other.

Example of Duplation.

IF you will double $\frac{3}{8}$ you shall divide $\frac{3}{8}$ by $\frac{1}{2}$, and thereof commeth $\frac{6}{8}$, which being abbreviated, are $\frac{3}{4}$: as by example.

$$\frac{1}{2} \times \frac{3}{8} = \frac{6}{8}$$

Or otherwise, in case the denominator of any fraction be an even number, you may take halfe the said denominator, without any other operation, and the numerator to abide still the numerator, unto the said halfe of the denominator of the fraction, as by the other example before rehearsed, that is to say, of $\frac{1}{2}$ take $\frac{1}{2}$, of 8 which is 4: and that is

the denominator, and 3 remaineth still numerator to 4 and it maketh $\frac{3}{4}$, and so of all other. But in case the denominator be an odde number, that is to say, not even, then you may multiply the numerator by 2, or else double the numerator, which is all one, & that fraction shall be doubled. Example. If you wil double $\frac{3}{5}$, you must only multiply the numerator 3, by 2, and they by 6, which maketh that fraction to be $\frac{6}{5}$, the which 6 being divided by 5, bringeth $1\frac{1}{5}$ and so much is the double of $\frac{3}{5}$

Example of Triplation.

If you will triple $\frac{3}{5}$ you must divide $\frac{3}{5}$ by $\frac{1}{5}$ & thereof cometh $\frac{9}{5}$ which being divided bringeth $1\frac{4}{5}$, or otherwise, because the denominator is an odde number, you may multiply the numerator 3 by 3, and thereof cometh 9, which maketh $\frac{9}{5}$, as before appeared.

Example of Quadruplation.

If you will quadruple $\frac{4}{5}$ you shall divide $\frac{4}{5}$ by $\frac{1}{4}$, and thereof cometh $\frac{16}{5}$, which 16 being divided by 5 bringeth $3\frac{1}{5}$, or otherwise, because the denominator of the fraction is an odde number, you shall multiply the numerator of the $\frac{4}{5}$, that is to say, 4 by 4, and thereof cometh 16; the which divide by 5,

and

and you shall find $3\frac{1}{5}$, as before. And this sufficeth for Duplation, Triplation, and Quadruplation.

Caap. 9.

Of the proofes of broken Numbers, And first of Reduction.

If you do abbreviate the broken numbers which be reduced, you shall returne them into their first estate: as by example, if you reduce $\frac{3}{5}$ with $\frac{4}{7}$, you shall finde $\frac{10}{15}$, and $\frac{12}{15}$, then abbreviate $\frac{10}{15}$, and you shall find $\frac{2}{3}$, abbreviate likewise $\frac{12}{15}$, and there of cometh $\frac{4}{5}$ as before.

The proof of Abbreviation.

If you doe multiply that number which you have abbreviated, by that or those numbers, by the which you have abbreviated thē, you shall returne thē again into their first estate. Example, if you will abbreviate $\frac{32}{48}$ by 16, in taking the $\frac{1}{16}$ part both of the numerator and also of the denominator, you shall finde $\frac{2}{3}$, the proof is thus, you must multiply both the numerator and denominator of $\frac{2}{3}$, that is to say, 3 by 16 maketh 48 for the denominator, and 2 by 16, maketh

32 for the numerator: then set the numerator 32, over the denominator 48, and they be $\frac{32}{48}$ as before.

If you doe subtract one of the numbers, or many of them (which you have added) from the totall summe, there shall remaine the other, or others: Example, if you do adde $\frac{1}{3}$ with $\frac{1}{4}$ you shall finde $\frac{7}{12}$. The proof is, if you subtract $\frac{1}{3}$ from $\frac{7}{12}$, you shall find remaining the other number, which is $\frac{1}{4}$ or else if you doe subtract $\frac{1}{4}$ from $\frac{7}{12}$ there will remaine the other number which is $\frac{1}{3}$.

The proof of Subtraction.

If you doe adde that number which remaineth, with the number which you did subtract, you shall finde the totall summe, out of the which you made the abatement: or otherwise, if you add the two lesser numbers together, you shall finde the greater. Example: if you subtract $\frac{1}{4}$ from $\frac{7}{12}$, there will remaine $\frac{1}{12}$. The proof is thus, you must adde $\frac{1}{12}$ & $\frac{1}{4}$ together and you shall finde $\frac{16}{48}$, the which being abbreviated, doth make $\frac{1}{3}$ which is the greatest number,

The proof of Multiplication.

If you divide the product of the whole multiplication, by the multiplicator, you

shall finde in your quotient, the multiplicand or number the which you have multiplied or else if you divide the totall sum which is come of the multiplication, by the multiplicand, you shall finde in the quotient the multiplicator. Example: If you multiply $\frac{3}{5}$ by $\frac{4}{7}$, the product of this multiplication will be $\frac{8}{15}$. The proof is thus: you shall divide $\frac{8}{15}$ by the multiplicator $\frac{4}{7}$. and thereof cometh $\frac{3}{5}$, which is the multiplicand: or else divide $\frac{8}{15}$ by $\frac{3}{5}$. and you shall finde the $\frac{4}{7}$, which is the multiplicator.

The proof of Division.

If you doe multiply the quotient by the divisor, you shall finde the number which you did divide, that is to say, your dividend. Example: If you divide $\frac{3}{5}$ by $\frac{3}{4}$ your quotient will be $\frac{8}{9}$ The proof is thus, you must multiply $\frac{8}{9}$ by $\frac{3}{4}$, and thereof cometh $\frac{24}{36}$, which being abbrevied are $\frac{3}{5}$, which is your dividend, and by this manner all whole numbers have their proofs as well as broken numbers,

Chap. 8.

Of certain Questions done by broken numbers. And first by Reduction.

FInde two numbers, whereof the $\frac{2}{7}$ of the one number, may be equall unto the $\frac{3}{8}$ of the other. Ans You shall reduce $\frac{2}{7}$ and $\frac{3}{8}$ cross-wise, and you shall finde 16 over the $\frac{2}{7}$, and 21, over the $\frac{3}{8}$, which are the two numbers that you seek: for the $\frac{3}{8}$ of 16 are 6: and so are the $\frac{2}{7}$ of 21, likewise 6: wherefore you may perceive that the $\frac{3}{8}$ of 16 which are 6, are equall unto the $\frac{2}{7}$ of 21, which is also 6.

2. Find two numbers, whereof the $\frac{2}{3}$ of the one, may be double to the $\frac{1}{4}$ of the other. Answer. Double $\frac{1}{4}$, and you shall have $\frac{2}{4}$, which being abbrevied is $\frac{1}{2}$: then reduce $\frac{2}{3}$ and $\frac{1}{2}$ cross-wise, and you shall finde 4 over the $\frac{2}{3}$, and 3 over the $\frac{1}{2}$, which are the two numbers that you seek: for the $\frac{2}{3}$ of 3, which is 2 is double unto the $\frac{1}{4}$ of 4, which is but 1.

3. Finde two numbers whereof the $\frac{2}{3}$ of the $\frac{1}{4}$ of the one, may be equall unto the $\frac{1}{4}$ of $\frac{1}{5}$ of the other. Answer. Adde the $\frac{2}{3}$ and $\frac{1}{4}$ together, and they make $\frac{7}{12}$, then adde $\frac{1}{4}$ and $\frac{1}{5}$ together, and they are $\frac{9}{20}$ then reduce $\frac{7}{12}$ and $\frac{9}{20}$ cresse-wise, and you shall have 140 over

over the $\frac{7}{12}$, and 108 over the $\frac{1}{20}$. which are the two numbers that you seek. For 63 which are the $\frac{7}{12}$ of 108, are also the $\frac{9}{20}$ of 140.

4. Find two numbers, whereof the $\frac{1}{2}$ the $\frac{1}{3}$ and the $\frac{1}{4}$ of the one of them, may be equal unto the $\frac{1}{5}$ $\frac{1}{6}$ and $\frac{1}{7}$, of the other number Ans. First you must adde $\frac{1}{2}$ $\frac{1}{3}$, and $\frac{1}{4}$ together, and they make $\frac{13}{12}$: then add $\frac{1}{5}$, $\frac{1}{6}$ and $\frac{1}{7}$ together, and they make $\frac{107}{210}$. Then reduce $\frac{13}{12}$ and $\frac{107}{210}$ cross-wise, as by the first question of reduction, and you shall finde 2730 over the $\frac{13}{12}$, and 1284 over the $\frac{107}{210}$, which are the two numbers that you seek: for 1391 which is the $\frac{1}{2}$ the $\frac{1}{3}$ the $\frac{1}{4}$ of 1284: is like to the $\frac{1}{5}$ $\frac{1}{6}$, and $\frac{1}{7}$ of 2730 which is also 1391.

5. Find three numbers, whereof, the $\frac{2}{5}$ of the first, the $\frac{5}{7}$ of the second, and $\frac{4}{9}$ of the third, may be equall the one to the other. Answer. Set down the $\frac{2}{5}$, $\frac{3}{7}$, and $\frac{4}{9}$, and then multiply the Denominator of the $\frac{2}{5}$, that is to say 5 by the Numerators of the other two Fractions, that is to say, by the numerator of $\frac{3}{7}$, and by the numerator of $\frac{4}{9}$, which is 3 and 4, and thereof commeth 60 for your first number: then shall you multiply the Denominator of the $\frac{3}{7}$, which is 7 by the numerators of $\frac{2}{5}$ and $\frac{4}{9}$, that is to say, by 2 and 4, and thereof cometh 56, for the

second number. Then multiply the denominator of $\frac{4}{9}$, that is to say, 9 by the numerator of $\frac{2}{5}$ & $\frac{3}{7}$, that is by 2 & 3, and thereof cometh 54, for the third number. And this the $\frac{2}{5}$ of 60, which is 24, is likewise the $\frac{3}{7}$ of 56, which is the second number, and is also the $\frac{4}{9}$ of 54, which is the third number.

6. Finde three numbers, of which the first and the second may be in such proportion as $\frac{1}{2}$ & $\frac{1}{3}$, and the second & third in such proportion as $\frac{1}{4}$ & $\frac{1}{5}$. Answ. Reduce $\frac{1}{2}$ and $\frac{1}{3}$ cross-wise, and you shall have 3 over the $\frac{1}{2}$, and 2 over the $\frac{1}{3}$, then reduce $\frac{1}{4}$ and $\frac{1}{5}$ in like manner, and you shall finde 5 over the $\frac{1}{4}$, and 4 over the $\frac{1}{5}$. Then say by the Rule of Three, if 5 doe give me 4 what shall 2 give me, which is the second proportionall, multiply the second number 4, by the third number 2, and thereof cometh 8, the which divide by the first number 5, and thereof cometh $1\frac{3}{5}$ for the third proportionall: and you shall finde that 3, 2, $1\frac{3}{5}$, are the three numbers proportionall that I demand, or else 14. 10. & 8, in whole numbers.

Questions done by Addition in Fractions

What number is that, unto the which if you adde 13 the whole amounteth to 31? Answ. Substract 13 from

from 31, and there will remaine 18, which is the number you seek.

2. What number is that, unto the which if you adde $\frac{2}{5}$, the addition will be $\frac{5}{6}$? Answ. Abate $\frac{2}{5}$ from $\frac{5}{6}$, and there will remaine $\frac{13}{30}$, which is the number that you desire.

3. What number is that whereunto if you adde $7\frac{2}{3}$, the whole addition will be $12\frac{1}{4}$? Answ. Abate $7\frac{2}{3}$ from $12\frac{1}{4}$, and the remain will be $4\frac{7}{12}$, which is the number that you desire to know.

4. What number is that whereunto if you adde the $\frac{3}{4}$ of it selfe, that is to say, of the number that you seek, the whole addition may be $\frac{5}{6}$? Answ. Here followeth a generall rule for all such like Questions: First of 3, which is the numerator of $\frac{3}{4}$ make that still the numerator: and likewise of 3 and 4 added together, which is both the numerator, and the denominator of the $\frac{3}{4}$, make them your denominator: so you shall finde $\frac{3}{7}$ then take the $\frac{3}{7}$ of $\frac{5}{6}$ which is $\frac{15}{42}$ or $\frac{5}{14}$, and substract them from $\frac{5}{6}$, and there will remain $\frac{13}{21}$ which is the number that you seek.

5. What number is that, unto the which if you adde his owne $\frac{2}{3}$ that is to say $\frac{2}{3}$ of it self, the whole addition shall be 20? Answ. Doe as in the last question, of the numerator

rator of $\frac{2}{5}$, that is to say of 2, make still your numerator: and likewise of the numerator 2 and the denominator 3 of the $\frac{2}{3}$ make of them both, your denominator: and you shal find $\frac{2}{5}$, then take the $\frac{2}{5}$ of 20 which are 8, and abate them from 20, and there will remain 12: which is the number that you desire. And so it is to be done of all such like reasons.

Questions done by Substraction. in Fractions.

WHat number is that, from the which if you do abate 17, the rest may be 19? Ans. Adde 17 and 19 together, and you shall find 37, which is the number that you seek.

2. What number is that, from the which if you abate $\frac{3}{5}$ the rest may be $\frac{1}{8}$ Ans. Adde $\frac{3}{5}$ and $\frac{1}{8}$ together, and you shall find $\frac{29}{40}$, which is the number that you demand.

3 What number is that, from the which if you reduct $13\frac{1}{2}$, the rest may be $5\frac{1}{7}$? Ans. Add $13\frac{1}{2}$ and $5\frac{1}{7}$ together, a thereof cometh $19\frac{3}{14}$, which is the number that you seek.

4. What number is that, from the which if you substract his $\frac{2}{3}$, that is to say $\frac{2}{3}$ of it selfe, the rest may be 12? Answer. And a rule for such like reasons: that is to say, from the denominator of $\frac{2}{3}$ which is 5 abate

2 which

2 which is his numerato2, and there reſteth 5 fo2 the denominato2, and thus of $\frac{2}{5}$ you have now made $\frac{2}{5}$, then take the $\frac{2}{5}$ of 12 which are 8, and adde them unto 12, and thereof commeth 20, fo2 the number which you deſire.

5. What number is that, from the which if you do abate his $\frac{3}{4}$, the reſt may be $\frac{8}{9}$? Anſ. From the denominato2 of $\frac{3}{4}$, which is 4, ſubſtract his numerato2 3 and there reſteth 1, thus of $\frac{3}{4}$ you have made $\frac{3}{1}$. Then multiply $\frac{3}{1}$ by $\frac{8}{9}$, and thereof cometh $2\frac{2}{3}$, the which adde unto $\frac{8}{9}$, and you ſhall have $3\frac{5}{9}$, which is the number that you ſeek.

6. What number is that from the which if you do abate his $\frac{4}{5}$, the reſt may be $12\frac{2}{3}$? Anſw. Doe as you did in the laſt queſtion, and you ſhall finde that the $\frac{4}{5}$ will be $\frac{4}{1}$: And therefore multiply $12\frac{2}{3}$ by $\frac{4}{1}$, and thereof commeth $50\frac{2}{3}$, the which adde unto $12\frac{8}{9}$, and you ſhall finde $63\frac{1}{3}$, fo2 the number that you demand. And thus of all ſuch like Queſtions.

Queſtions of Multiplication in Fractions.

WHat number is that, which being multiplyed by 13, the whole p2oduct of that multiplication ſhall make 221? Anſw. Divide 221 by 13, and thereof commeth

cometh 17, which is the number that you seek.

2. What number is that which being multiplied by 15 the whole multiplication will amount to $\frac{3}{4}$? Answ. Divide $\frac{3}{4}$ by $\frac{15}{1}$, and thereof cometh $\frac{1}{20}$, which is the number that you seek.

3. What number is that, which being multiplied by 21, the whole multiplication will be $16\frac{4}{5}$? Answ. Divide $16\frac{4}{5}$ by $\frac{21}{1}$, and you shall finde $\frac{4}{5}$, and that is the number that you demand.

4. What number is that, which being multiplied by $\frac{3}{4}$, the multiplication will amount to 18? Answ. Divide $\frac{18}{1}$ by $\frac{3}{4}$, and thereof cometh 24 which is the number that you desire to know.

5. What number is that which if it be multiplied by $\frac{2}{3}$, the whole multiplication will be $\frac{1}{4}$? Answ. Divide $\frac{1}{4}$ by $\frac{2}{3}$, and the quotient will be $\frac{3}{8}$ which is the number that you require to know.

6. What number is that, which being multiplyed by $\frac{5}{8}$, the product of the multiplication will be $16\frac{2}{3}$? Answ. Divide $16\frac{2}{3}$ by $\frac{5}{8}$, and thereof cometh $26\frac{2}{3}$, which is the number that you seek.

Here

Here enſueth other neceſſary Queſtions, which are wrought by Multiplication, in broken numbers.

I Demand how much the $\frac{5}{8}$ of 20 s. are worth, or what are the $\frac{5}{8}$ of 20 s? Anſw. You muſt multiply $\frac{5}{8}$ by $\frac{20}{1}$, and the product will be $\frac{100}{8}$, therefore divide 100 by 8, and thereof cometh 12 which, is to ſay, 12 s. 6 d. and ſo much are the $\frac{5}{8}$ of 20 s. worth.

2. I demand what the $\frac{3}{4}$ of $\frac{5}{6}$ of a pound of money are worth? That is to ſay of 20 s. Anſw. Multiply $\frac{3}{4}$ by $\frac{5}{6}$, and thereof cometh $\frac{15}{24}$: Then take the $\frac{5}{8}$ of 20 s. as in the laſt Queſtion going before, and you ſhall finde 12 s. 6 d. and ſo much are $\frac{3}{4}$ of $\frac{5}{6}$ of 20 s. worth.

3. I demand what the $\frac{2}{3}$ of 8 d. $\frac{1}{2}$ are worth? Anſw. Multiply 8 $\frac{1}{2}$ by $\frac{2}{3}$ or elſe $\frac{2}{3}$ by 8 $\frac{1}{2}$, which is all one, and you ſhall finde $\frac{34}{6}$: Then divide 34 by 6, and your Quotient will be 5 d. $\frac{2}{3}$, and ſo much are the $\frac{2}{3}$ of 8 d. $\frac{1}{2}$ worth.

4. What are the $\frac{3}{4}$ of 14 d. $\frac{3}{5}$? Anſw. Multiply 14 $\frac{3}{5}$ by $\frac{3}{4}$, and thereof commeth $\frac{219}{20}$: Therefore divide 219 by 20, and your Quotient will be 10 d. $\frac{19}{20}$: and ſo much are the $\frac{3}{4}$ of 14 $\frac{3}{5}$.

5. How

5. How many quarters or fourth parts are contained in $7\frac{2}{3}$? Answ. Multiply $7\frac{2}{3}$ by $\frac{4}{1}$ (because one whole containeth 4 quarters) and thereof cometh $30\frac{2}{3}$, and so many quarters are in the $7\frac{2}{3}$, that is to say, 30 quarters and $\frac{2}{3}$ of a quarter.

6. How many thirds are in $\frac{3}{4}$ and $\frac{1}{2}$ that is to say, in 3 quarters, and $\frac{1}{2}$ of one quarter or $\frac{3}{8}$? which are $\frac{7}{8}$ by the fift Reduction Ans. Multiply $\frac{7}{8}$ by $\frac{3}{1}$ (for because that in 1 whole are contained 3 thirds) thereof cometh $2\frac{5}{8}$, the which $2\frac{5}{8}$ doe signifie $\frac{2}{3}$ and $\frac{5}{8}$ of a third: and so many thirds are in $\frac{3}{4}$ + $\frac{1}{2}$ or in $\frac{7}{8}$, which is all one.

Questions done by Division in broken numbers.

1. What number is that, which being divided by 17, the quotient will be 13? Answ. Multiply 17 by 13, and thereof cometh 221, which is the number that you seeke.

2. What number is that, which being divided by $\frac{3}{4}$, the quotient will be 21? Ans. Multiply $\frac{21}{1}$ by $\frac{3}{4}$ and thereof cometh $63\frac{3}{4}$: Then divide 63 by 4, and thereof cometh $15\frac{3}{4}$: which is the number that you seek.

3. What number is that, which being divided by $\frac{1}{3}$, the quotient will be $\frac{2}{3}$? Ans.

Multiply

Multiply $\frac{2}{3}$ by $\frac{5}{8}$, and thereof commeth $\frac{2}{24}$: which being abbrevied are $\frac{1}{12}$ for the number which you require.

4. What number is that, which being divided by $\frac{4}{5}$, the quotient will be $16\frac{2}{3}$? Anſw. Multiply $16\frac{2}{3}$ by $\frac{4}{5}$, and thereof commeth $\frac{200}{15}$. Therefore divide 200 by 15, and thereof cometh $13\frac{1}{3}$, which is the number that you deſire to finde.

5. What number is that, which being divided by $13\frac{1}{3}$, the quotient will be 20? Anſw. Multiply $\frac{20}{1}$ by $13\frac{1}{3}$, & thereof commeth $\frac{800}{3}$ then divide 800 by 3 and thereof cometh $266\frac{2}{3}$: for the number which you ſeek.

6. What number is that, which if it be divided by $12\frac{1}{2}$ the quotient will be $\frac{7}{8}$? Anſ. Multiply $12\frac{1}{2}$ by $\frac{7}{8}$, and thereof cometh $\frac{175}{16}$ then divide 175 by 16, and thereof cometh $10\frac{15}{16}$: for the number which you deſire.

Other neceſſary queſtions done by Diviſion in broken numbers.

I Demand what part 30 is of 70? Anſw. divide 30 by 70, which you cannot, for they are $\frac{30}{70}$, but abbrevy them, and they are $\frac{3}{7}$: thus 30 are the $\frac{3}{7}$ of 70.

2. I demand what part 10 is of $16\frac{2}{3}$? Anſw. Divide $\frac{10}{1}$ by $16\frac{2}{3}$, and thereof commeth

meth $\frac{30}{100}$, which being abbrevied are $\frac{3}{10}$. And thus 10 is found to be $\frac{3}{10}$ of 16 $\frac{2}{3}$.

3. More, $\frac{1}{8}$ of one unit, what part are they of 25? Ans. Divide $\frac{1}{8}$ by $\frac{25}{1}$ and thereof cometh $\frac{1}{200}$, which being abbrevied is $\frac{1}{40}$, and thus $\frac{1}{8}$ of 1, is but the $\frac{1}{40}$ of 25.

4. More, $\frac{5}{6}$ what part are they of $\frac{7}{8}$? Ans. Divide $\frac{5}{6}$ by $\frac{7}{8}$, and you shall finde $\frac{40}{42}$ which abbrevied are $\frac{40}{21}$.

5. More, $\frac{4}{5}$ of 1 what part are they of 13 $\frac{1}{3}$? Ans. Divide $\frac{4}{5}$ by 13 $\frac{1}{3}$ and you shall find $\frac{12}{200}$, which being abbrevied are $\frac{3}{50}$. And thus $\frac{4}{5}$ of 1, are the $\frac{3}{50}$ of 13 $\frac{1}{3}$.

6. More, 12 $\frac{1}{2}$ what part are they of 30? Ans. Divide 12 $\frac{1}{2}$ by $\frac{30}{1}$, and you shall finde $\frac{30}{600}$, which being abbrevied are $\frac{5}{12}$ and thus 12 $\frac{1}{2}$, are the $\frac{5}{12}$ of 30.

7. More, 16 $\frac{2}{3}$ what part are they of 57 $\frac{1}{7}$? Answ. Divide 16 $\frac{2}{3}$ by 57 $\frac{1}{7}$, and thereof cometh $\frac{350}{1200}$ which being abbrevied are $\frac{7}{24}$: and thus 16 $\frac{2}{3}$ are the $\frac{7}{24}$ of $\frac{1}{7}$.

8. More $\frac{3}{4}$ & $\frac{2}{3}$ of $\frac{1}{4}$, or 3 quarters and $\frac{2}{3}$ of one quarter, what part are they of 1? Ans, reduce $\frac{3}{4}$ & the $\frac{2}{3}$ of $\frac{1}{4}$ into one broken number by the 5 reduction, and you shall find $\frac{11}{12}$. And thus the $\frac{3}{4}$ $\frac{2}{3}$ of $\frac{1}{4}$, are the $\frac{11}{12}$ of 1 whole.

9. More of what number are 9 the $\frac{2}{3}$? Ans. Divide 9 by $\frac{2}{3}$, & thereof cometh 13 $\frac{1}{3}$: which is the number whereof 9 are the $\frac{2}{3}$.

10 More,

10. Note, of what number are $\frac{2}{3}$ the $\frac{3}{4}$? Answ. Divide $\frac{2}{3}$ by $\frac{3}{4}$, and thereof commeth $\frac{8}{15}$ which is the number whereof $\frac{2}{3}$ are the $\frac{3}{4}$ of the same number.

11. Note, of what number are $5\frac{3}{4}$ the $\frac{3}{7}$? Answ. Divide $5\frac{3}{4}$ by $\frac{3}{7}$, and you shall find $13\frac{5}{12}$, which is the number whereof $5\frac{3}{4}$ are the $\frac{3}{7}$.

12. Note, $9\frac{3}{5}$ what part are they of $33\frac{1}{2}$? Answ. Divide $9\frac{3}{5}$, by $33\frac{1}{2}$, and thereof commeth $\frac{48}{201}$: and thus $9\frac{3}{5}$ are the $\frac{48}{201}$ of $33\frac{1}{2}$ as appeareth.

The third part treateth of certaine brief Rules called Rules of Practice, with diuers necessary Questions: profitable not onely for Merchants, but also for all other Occupiers.

CHAP. I.

Some there be, which doe call these Rules of Practise, brief Rules: for that by them, many Questions may be done with quicker expedition, than by the rule of Three. There be others which call them the small Multiplication, for because that the Product is alwaies lesse in quantity than the number which is to be multiplyed. This practice cometh not in use, but onely amongst small kinds of numbers, which have over them other numbers that are greater. And this being well considered, is no other thing but to convert lesser, and particular kinds of numbers, into greater: the which may be done by the meanes of division, in taking the half, the third, the fourth, the fift, or such other parts of the summe, which is to be multiplyed, as the multiplier is part of his greater kind, and that which commeth thereof, is worth as much

much (not in quantity, but in his owne forme and quality) as if you did multiply simply the two lines, the one by the other. And for the better understanding of such conversions, you must have respect to one of these two considerations: the first is, when one would demand this question, At 6 d. the yard of Cotten, what are 18 yards worth by the price? it is manifest that they are worth 18 pieces of 6 pence the peice, or 18 half shillings, which must be turned into shillings in taking the halfe of 18 s. and they make 9 s: Or otherwise you must consider that at 1 s. the yard, the 18 yards are worth 18 s. Therefore at 6 d. they shall be but paide so much, for 6 d. is but the $\frac{1}{2}$ of 1 s. Therefore you must take the $\frac{1}{2}$ of 18 s. and they make 9 s. which are worth as much as 108 d. that is to say, as 18 times 6 pence.

* *Rule. An aliquot part of an even part of shilling of a pound or of another thing, $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ &c. are called aliquot parts.*

First, if you will multiply any number after this manner by pence, whereof the number of the same pence doe not extend unto 12, and thereof to bring shillings into the product; you must know the aliquot parts of 12, which are these: that is to say, 6, 4, 3, 2, & 1. For 6 is the $\frac{1}{2}$ of 12, & 4 is the $\frac{1}{3}$ of 12, 3 is the $\frac{1}{4}$, 2 is the $\frac{1}{6}$, & 1 is the $\frac{1}{12}$. Then for 6 d. which is the half of 1 s.

you muſt take the $\frac{1}{2}$ of all the number which is to be multiplied: and that which commeth thereof ſhall be ſhillings: if there doe remaine 1, it is 6 pence.

For 4 pence, you muſt take the $\frac{1}{3}$ of all the number that is to be multiplyed: and if any units doe remain, they ſhall be thirds of a ſhilling, every one being in value 4 d

For 3 pence you muſt take the $\frac{1}{4}$ of all the ſumme: if any units doe remaine they ſhall be fourths of a ſhilling, every one being worth 3 pence.

For 2 peny, you muſt take the $\frac{1}{6}$ of all the ſumme, and if any units doe remaine they ſhall be 6 parts of a ſhilling, being every one of them worth 2 pence.

For 1 peny take the $\frac{1}{12}$ of the whole ſumme, if any units doe remain, they are the twelfth parts of a ſhilling, each of them being in value 1 d. as by theſe examples following doth plainly appeare.

Example I.

At 6 pence the yard,
What are 59 yards worth.

29 ſhil: 6. Pence.

II.

At 4 Pence the yard,
What are 82 yards?

2 shil. 4 pence.

III.

At 3 Pence the yard,
What 96 yards?

24 shil. 3 pence.

IV.

At 2 pence the yard,
What 346 yards?

57 shil. 8 pence.

V.

At 1 peny the yard,
What 343 yards?

28 shil. 7 pence.

Here you may see in the first example, that 59 yards at 6 d. the yard, are worth 29 s. 6 d. in taking the $\frac{1}{2}$ of 59.

And in the second example, the 82 yards at 4 d the yard, are worth 27 s. 4 d. in taking the $\frac{1}{3}$ of 82.

Likewise in the third example, 97 yards, at 4 d. the yard bringeth 24 s. 3 d. in taking the $\frac{1}{4}$ of 97.

Also in the fourth example 346 yards, at 2 d. the yard, maketh 57 s. 8 d. in taking the $\frac{1}{6}$ of 346.

And finally, in the 5th example, 343 yards at 1 d. the yard amounts to 28 s. 7 d. in taking the $\frac{1}{12}$ of 343. And so is to be done of all such like, when the number of the pence is any of the aliquot parts of 12.

But if the number of the pence be not an aliquot part of 12, you must reduce them into some aliquot parts of 12: and after the aforesaid manner, you shall make of them two or three products as need shall require, and adde them together into one sum; as 5 d. may be reduced into 4 d. and 1 d. or else into 3. and 2 d. For 4 d. and 1 d. doe make 5 d. and so doe 3 d. and 2 d. the like. Wherefore if you will work by 4, and by 1: you must for 4 d. take first the $\frac{1}{3}$. of the number that is to be multiplied, and for 1 d. take the $\frac{1}{12}$ of the whole sum, or rather for 1 d. ye may take the $\frac{1}{4}$ of the product which did come of the 4 d. because that 1 d. is the $\frac{1}{4}$ of 4 d. But if you will work by 3 d. and 2 d. you shall take for 3 d. the $\frac{1}{4}$ of the number which is to be multiplied: and likewise for 2 d. the $\frac{1}{6}$ of the same number, adding together both the products. And the total sum of these two numbers shall be

the solution to the question. And in like manner is to be done of all others.

As by these examples following may appears:

Example. I.

At 5 pence the yard.
What wil 49 yards amount unto?

16 shil. 4 pence.
4. shil. 1 d.

20 shil. 5 d.

II.

At 7 d. the lib.
What will 54 lib. cost?

18 shil. 0 d.
13 shil. 6 d.

31 shil. 6 d.

III.

At 8 pence the piece,
What are 40 worth?

13 shil. 4 d.
13 shil. 4 d.

26 shil. 8 d.

Other wayes.

At 8 pence the piece,
VVhat are 40 pieces worth. ?

20 ſhil.
6 ſhil. 8 d.

26 ſhil. 8 d.

IV.

At 9 pence the yard,
VVhat are 73 yards ?

39 ſhil. 6 d.
18 ſhil. 3 d.

54 ſhil. 9 d.

V.

At 10 pence the ell.
What are 32 Ells ?

16 ſhil. 0 d.
10 ſhil. 8 d.

26 ſhil 8 d.

VI.

At 11 d. the lib.
VVhat are 27 lib ?

9 ſhil. 0.
9 ſhil. 0.
6 ſhil 8.

24 ſhil. 8 d.

Here

Here in this first example, where it is demanded (at 5 pence the yard) what will 49 yards amount unto? First, for 4 d. I take the $\frac{1}{3}$ of 49 s. and thereof commeth 16 s. 4 d. then for 1 d. I take the $\frac{1}{4}$ of the same product, that is to say, of 16 s. 4 d. and that bringeth 4 s. 1 d. these two sums added together do make 20 s. 5 d. And so much are the 49 yards worth at 5 the yard.

For 7 d. take the $\frac{1}{3}$ and the $\frac{1}{4}$ of the whole summe which is to be multiplied, and adde them together, that is to say, for 4 d. you must take the $\frac{1}{3}$: and for 3 d the $\frac{1}{4}$ because 4 d. is the $\frac{1}{3}$ of 12 d. and 3 d. is the $\frac{1}{4}$, as in the second example before doth appeare, where the question is thus, at 7 d. the l. what will 54 l. cost? First, for 4 d I take the $\frac{1}{3}$ of 54 and they make 18 s. Likewise for 3 d. I take $\frac{1}{4}$ of 54, and they are 13 s. 6 d. Then I adde 18 s. and 13 s. 6 d. together, so both amount to 31 s. 6 d. and so much are the 54 l. at 7 d. the l.

Otherwise for 7 d. you shall take first the $\frac{1}{3}$ of the whole summe for 6 d. Then for 1 d. you must take the $\frac{1}{6}$ of the same product and adde them together, so you shall have the like summe as before.

For 8 d. you must first take $\frac{1}{3}$ of the whole summe for 4 d: and another $\frac{1}{3}$ for

other

other 4 d. and adde them together, as in this example both evidently appeare. Where the question is thus, at 8 d. the piece, what are 40 pieces worth? First, for 4 d. I take the $\frac{1}{3}$ of 40 which is 13 s. 4 d.? Again, I take another $\frac{1}{3}$ for the other 4 d. which is also 13 s. and 4 d. These two summes being added together. doe make 29 s. 8. d. and so much are the 40 pieces worth, at 8 d the piece: as in the third example aboveſaid both appeare.

Otherwise for 8 d. you may take first the $\frac{1}{5}$ of the whole summe for 6 d. Then for 2 d you shall take the $\frac{1}{3}$ of the product, which did come of the said $\frac{1}{3}$ and adde them together: so shall you have likewise the solution to the question. As in the same third example of 40 yards: I take first the $\frac{1}{3}$ of 40 for 6 d. and thereof commeth 20 s. then for 2 d, I take $\frac{1}{3}$ of the said product that is to say of 20 s. which bringeth 6 s. 8 d. these two summes (20 s. and 6 s. 8 d.) I adde together, and they make 26 s. 8 d. as before.

For 9 d. you must take the $\frac{1}{3}$, and the $\frac{1}{4}$ of the whole summe, and adde them together: or else for 6 d. take first $\frac{1}{2}$ of the whole summe, then for 3 d. take $\frac{1}{2}$ of the same product, because 3 d. is the halfe of 6 d. And 6 d. added with 3 d. bringeth 9 d. as by the

fourth

fourth example where it is demanded after this sort, at 9 d the yard, what are 73 yards worth? First for 6 d. I take the $\frac{1}{2}$ of 73 l: and thereof cometh 36 s. 6 d. then for 3 d. I take $\frac{1}{2}$ of the same 36 s. 6 d. which is 18 s. 3 d, these two summes I add together, and they make 54 s. 9 d. as in the said fourth example is evident.

For 10 d. take first the $\frac{1}{2}$, then the $\frac{1}{5}$ of the whole summe: and add them together and it is done.

For 11 d. take first $\frac{1}{2}$ for 4 d. secondly, another $\frac{1}{3}$ for other 4 d. and thirdly $\frac{1}{4}$ for 3 d. (of all the whole summe) and adde them together, and that answereth the question.

Otherwise for 11 d. take first the $\frac{1}{2}$ for 6 d. then the $\frac{1}{3}$ of the whole summe for 4 d. and finally, the $\frac{1}{4}$ of the last product for 1 d. adding them together, and it will be like to the other.

Likewise by the same reason, when you will multiply (by shillings) and any number that is under 20 s. you shall have in the product pounds, if you know the aliquot parts of 20, which are these: 10, 5, 4, 2, & 1 For 10 is $\frac{1}{2}$ of 20 5 is the $\frac{1}{4}$ part, 4 is the $\frac{1}{5}$, 2 is the $\frac{1}{10}$, and 1 is the $\frac{1}{20}$.

When for 10 s. which is the $\frac{1}{2}$ of a pound, you must take the $\frac{1}{2}$ of that number which is

to be multiplied, and you shall have pounds in the product. If there doe remaine 1, it shall be worth 10 s.

For 5 s. you must take the $\frac{1}{4}$ of the number which is to be multiplied, and if there do remain any units, they shall be fourth parts of a pound, every unit being in value 5 s.

For 4 s. you must take $\frac{1}{5}$ of the number which is to be multiplied: And if there doe remain any units, they shall be fift parts of a pound, every unit being worth 4 s.

Example.

At 10 shil. the peice,
What are 75 pieces worth.

37 lib. 10 shil.

At 5 shil the yard,
What are 89 yards worth?

22 lib. 5 shil.

At 4 shil. the Ell,
What are 93 Ells worth?

18 lib. 12 shil.

For 2 s. you must take the $\frac{1}{10}$ of the number that is to be multiplied. Where-

fore

fore if you will take the $\frac{1}{10}$ of any number you must separate the last figure of the same number, (which is nearest your right hand) from all the other figures, with a small stroke or daly with a pen. For all the other figures which do remaine towards your left hand from the same figure that you doe separate, shall be the said $\frac{1}{10}$ of a pound: and that figure so separated towards your right hand, shal be so many pieces of 2s. the peice, the which figure must be doubled to make theresf shillings, asby these examples appeareth.

At 2 shil. the lib.
VVhat are 958 lib. worth?

9 lib. 16 shil.

At 2 shil. the dozen,
VVhat are 403 dozens worth?

40 lib. 6 shil.

Here upon dependeth another exact way, for to multiply by shillings (if the number of shillings be even) which is thus: you shall take $\frac{1}{2}$ of the number of the same shillings, and convert them into pieces of 2 shillings. Then by the number of this halfe, you must first multiply the last figure, towards

ward your right hand) of the number which is to be multiplied. And if there be any tens in the same product, those must you reserve in your mind: But (if with the same, or else without the same) you finde any digit number, the same digit number shall you double, and put it into the place of shillings. Then must you proceed to the multiplication of the other figures, adding unto the product, the tens which you before reserved: and thereof shall come pounds

Now for your better understanding of this which hath been said, and by the way of example, I will propound unto you this question.

At 8 s. the grosse, what are 97 grosse worth after the rate?

First in this example I take halfe the number of shil. as before is taught, that is to say, of 8 shillings, which is 4 shillings: this 4 shillings I put apart behind a crooked line, right against 97 towards the left hand as here you may see, and as hereafter appeareth by divers examples.

At 8 shil. the grosse,
4) What will 97 grosse cost?

38 lib. 16 lib.

At

At 6 ſhil. the yard,

3) What 9 l 9

29 lib. 14 ſhil.

At 12 ſhil.

6) What 34 l 5 ?

207 lib. 0 ſhil.

At 14 ſhil.

7) What 21 l 0 ?

147 lib. 0 ſhil.

Now in the firſt example, where it is demanded at 8 s. the groſſe, what are 97 groſſe? Firſt the ½ of 8 s. which is 4 s. being ſet apart behind the croked line, as before is ſaid: then I multiply the 97 by 4, ſaying firſt, 4 times 7 is 28 I double the digit number 8, and that maketh 16, the which 16, I doe put under the line, in the place of ſhillings, and I kepe the 2 tens in my mind, which here in worke do repreſent 2 l. Then ſecondly, I multiply 9 by the ſaid 4, and thereof cometh 36 whereunto I adde the 2 l. which before I did reſerve, and they make 38. Therefore I put 38, under the line in the place of pounds, and the whole ſumm will be 38 l. 16 s. Thus, much are the 97 groſſe worth, at 8 s. the groſſe: the like is to be done of all other.

As

As of 12 s. in multiplying by 6. Likewise of 6 s. if you multiply by 3: also of 14, if you multiply by 7. And so of all even numbers after the same manner.

For 1 s. you must take the $\frac{1}{2}$ of the $\frac{1}{10}$ part, of any number that is to be multiplied.

At 1 shil.
VVhat 150?

17 lib 10 shil.

And if any thing doth remain they are shillings. Thus by this manner shil. are converted into pounds: for it is even like as though you did divide them by 20 shil. as by this example aboveſaid doth appeare Where it is demanded at 1 s. the yard, the peice or any other thing, what are 350 yards or peices worth.

First, I separate the laſt figure of 350 next to my right hand, which is the 0, with a line betweene it and the figure 5: then I make a like under the 350, and I take the $\frac{1}{2}$ of 35, after this manner; saying the $\frac{1}{2}$ of 3 is 1, and 1 remaineth, which remain ſignifieth 10, in that ſecond place: then I put 1 under the line againſt 3, and I proceed to the reſt, saying the halfe of 15 s. is 7. (the which 15 came of the 1 that remained, and of the 5 in the 1 place.) I put 7 under

der the line, right against 5, and they make 17 l. The 1 which did last remain is 10 s. Now I put 10 s. apart under the line, and the whole summe is 17 l. 10 s. so much are 350 worth 1 s. the peice.

But when the number of shillings is not some aliquot part of 20 s. you must then convert the same number of shillings, into the aliquot parts of 20, and make two or three products as need shall require. the which must be added together after this manner following.

For 3 shillings, you must first take for 2 s. the $\frac{1}{10}$ of the number that is to be multiplied, then for 1 shilling, you must take the $\frac{1}{2}$ of the product which did come of the same $\frac{1}{10}$ part: and adde these two summes together, as appeareth by [illegible]example following.

At 3 s. the peice of any thing, what shall 684 peices cost me after the rate? First, for 2 shillings I take the $\frac{1}{10}$ of 684, which is 68, in separating the last figure 4 which I must double, and they be 8: I set 8 s. apart from the place of pounds, and then I have 68 pounds 8 s. for the $\frac{1}{10}$ part, that is to say, for the 2 s. Secondly,

At 3 shil. —
What 684?

6 lib. 8 shil.
34 lib 4 shil.
100 li. 12 shil.

for 1 s. I take the $\frac{1}{2}$ of the product, that is to say, of 68 l. 8 s. which is 34 l. 4 s. and I put the same under the 68 l. 8 s. Then finally, I adde those two summes together, that is to say, 68 l. 8 s. and 34 l. 4 s. so they make 102 l. 12 s. and so much are the 684 pieces worth at 3 s. the piece, as may appeare in the preceding margent.

For 6 s. take $\frac{1}{10}$ of the number which is to be multiplied: that is to say, take first $\frac{1}{10}$, then double the product of the same $\frac{1}{10}$ and adde them together. Or otherwise for 4 s. take first the $\frac{1}{5}$ of the number that is to be multiplied, then for 2 s. take $\frac{1}{2}$ of the product, and adde them together.

Or else take for 5 s. the $\frac{1}{4}$ of the whole summe, then for 1 s. take the $\frac{1}{5}$ of the product, and adde them together,

Likewise for 7 s. take first for 5 s the $\frac{1}{4}$, then for 2 s. take the $\frac{1}{10}$ of the number which is to be multiplied, and adde them together.

For 8 s. take the $\frac{2}{5}$ at two sundry times, that is to say, first $\frac{1}{5}$ for 4 s. & then as much more for other 4 s. and adde them together.

For 9 s. take first the $\frac{1}{4}$ and likewise the $\frac{1}{7}$ of the number that is to be multiplied, and adde them together.

For 11 s. take first the $\frac{1}{2}$ for 10 s. Then for

for 1 s. take the $\frac{1}{10}$ of the product, and adde them together, or else for 5 s. take the $\frac{1}{4}$: then for 4 s. take the $\frac{1}{5}$, and lastly, for 2 s. take the $\frac{1}{2}$ of the last product, and adde them together

For 12 s. take first the $\frac{1}{2}$ for 10 s. then for 2 s. take the $\frac{1}{5}$ part of the product and adde them together.

For 13 s. take the $\frac{1}{4}$, then the $\frac{1}{5}$ and again another $\frac{1}{5}$ of the number which is to be multiplied, and adde the products together, that is to say, first for 5 s. take the $\frac{1}{4}$. then for 4 s. take the $\frac{1}{5}$. And again another $\frac{1}{5}$ for the other 4 s. and adde the 3 products together. The like is to be done in all others, when the price of the thing which is valued, is onely of shillings, as by these examples following doth plainly appeare.

At 6 shil.

VVhat 67?

13 lib.	8 shil.
6	14
20 lib.	2 shil.

At 7 shil.

VVhat 347?

86	15
34	14
121 lib.	9 shil.

At 8 shil.

VVhat 540?

108 lib. 0 shil.
108 0 shil.

216 lib. 0 shil.

At 9 shil.

VVhat 230?

57 10
46 00

103 lib. 10 shil.

At 11 shil.

What 159?

79 10
7 19

87 lib. 9 shil.

At 12 shil.

What 349?

174 10
34 18

209 lib 8 shil.

At 13 shil.

VVhat 267?

66 15
53 8

173 lib. 11 shil.

Like

Likewise in multiplying by pence, you shall have (at the first instant) pounds in the product, in case you know the aliquot parts of the $\frac{1}{10}$ of a pound, or of 24 d. which are these, 12, 8, 6, 4, 3, and 2. For 12, is the $\frac{1}{2}$ of 24: 8 is the $\frac{1}{3}$: 6 is the $\frac{1}{4}$: 4 is the $\frac{1}{6}$: 3 is the $\frac{1}{8}$: and 2 is the $\frac{1}{12}$: but for 12 d. which is 1 s. I have before made mention thereof.

For 8 d, you must take the $\frac{1}{3}$ of the $\frac{1}{10}$ and the rest which are the peices of 8 d. must be doubled to make of them peices of 4 d. And of the same number being doubled, you must take the $\frac{1}{3}$ which will be shillings, and if there doe yet remain any thing, they are thirds of a shilling, being in value 4 d. the piece.

For 6 d. take the $\frac{1}{2}$ of the $\frac{1}{10}$, and of that remaineth, you must take the $\frac{1}{2}$ which shall be shillings: if there doe yet remain 1, it shall be in value 6 d.

For 4 d. you must take the $\frac{1}{6}$ of the $\frac{1}{10}$ and of that which resteth take the $\frac{1}{3}$ to make thereof shillings: if any thing doe yet remaine, they are thirds of a shilling, being in value 4 pence the peice.

For 3 pence take the $\frac{1}{8}$ of the $\frac{1}{10}$, and of that remaineth, take $\frac{1}{4}$ to make of them shillings: if any thing doe yet remaine,

they are fourths of a shilling, every one of them being worth 3 d.

For 2 d. take the $\frac{1}{12}$ of the $\frac{1}{10}$ and of that which resteth, take $\frac{1}{6}$ the which are shillings, if there doe still remain any thing, they shall be sixt parts of a shil. every one being in value 2 d.

For 1 d. you shall understand that it is not possible with ease to bring of d. pounds (into the product) upon the totall summe: But first you must bring them into shil. by the order of the second Rule of this Chapter and then afterward you shall convert them into pounds, if need so require, as by those examples following may appeare.

At 8 d.
What 59|6 ?
19 lib. 17 shil. 4 d.

At 6 d.
What 678 ?
16 lib. 19 shil.

At 4 d.
What 934 ?
15 lib. 11 shil. 4 d.

At 3 d.
What 57|1 ?
7 lib. 2 shil, 9 d.

At

At 2 d.
VVhat 36|4 ?

3 lib. 0 ſhil. 8 d.

At 1 d.
VVhat 676 ?

5 lib 12 ſhil. 8 d.
2 lib 16 ſhil. 4 d.

But if the number of pence, be not an aliquot part of 24 pence, then muſt you bring them into the aliquot parts of 24, and make thereof diuers products, which muſt be added together as ſhall hereafter appeare.

For 5 d. you ſhall firſt take the 3 d. then for 2 d. and adde them together, according to the inſtruction of the laſt Rule. Or elſe, firſt take for 4 d. and then for 1 d.

For 7 d. firſt take for 4 d. then for 3 d. and adde them together.

For 9 d. take firſt for 6 d. then for 3 d. adding them together.

For 10 d. firſt take for 6 d. then for 4 d and adde them together.

For 11 d. take firſt for 8 d. then for 3 d. and adde them together; as by theſe examples following doth appeare.

At 5 d.

VVhat 92|7 ?

11	11	9
7	14	6

19 lib. 6 ſhil. 3 d.

At 7 d.

VVhat 51|2 ?

8	10	8
6	8	0

14 lib. 18 ſhil 8 d.

At 9 d.

VVhat 54|6 ?

13	13	0
6	16	6

20 lib. 9 ſhil 6 d.

At 10 d.

VVhat 27|3 ?

6	16	6
4	11	0

11 lib. 7 ſhil. 6 d.

At 11 d.

VVhat 26|2 ?

8	16	0
3	6	0

12 lib. 2 ſhil. 3 d.

If you will multiply any number by ſhillings,

lings and pence being both together, you must take first for the s. according to the instruction of the third Rule of this first Chapter, then take for the d. after the order of the fift Rule before mentioned: but if there be any aliquot parts of 1 l. containing both shil. and pence, then for those parts you shall take such like part of the number that is to be multiplied as the number is part of 1 l. the which aliquot parts are these, 6 s. 8 d. 3 s. 4 d. 2 s. 6 d. and 1 s. 8 d. for 6 s. 8 d. is the $\frac{1}{3}$ of a l. 3 s. 4 d. is the $\frac{1}{6}$ of a l. 2 s. 6 d. is the $\frac{1}{8}$ and 1 s. 8 d. is the $\frac{1}{12}$ of a pound or of 20 s. And therefore for 6 s. 8 d. you must take the $\frac{1}{3}$ of the number that is to be multiplied: and if any thing do remaine, they are parts of a l. every one being worth 6 s. 8 d.

For 3 s. 4 d. you must take the $\frac{1}{6}$ of the number which is to be multiplied, and if any thing doe remain they are 6 parts of a l. every one being in value 3 s. 4 d.

For 2 s. 6 d. you must take the $\frac{1}{8}$: if any thing be remaining they are 8 parts of a l. each one being worth 2 s. 6 d.

For 1 s. 8 d. you shall take the $\frac{1}{12}$, the number that is to be multiplied, and if there do any thing remain, they are twelve parts of a l. every one being in value 1 s. 8 d.

At 6 shil. 8 d.
What 647 ?

215 lib. 13 shil. 4 d.

At 3 shil. 4 d.
What 220 ?

36 lib. 13 shil. 4 d.

At 2 shil. 6 d.
What 47 ?

5 lib. 17 shil. 6 d.

At 1 shil. 8 d.
What 400 ?

33 lib. 6 shil. 8 d.

Rule 7 Here shall you accustome your selfe to multiply by all sorts of sums, being composed of shillings, and pence, which may come in use or practice. As thus, for 1 s. 1 d. for 1 s. 2 d : 1 s. 3 d : for 1 s. 4 d : Likewise for 2 s. 1 d. 2 s. 2 d. 2 s. 3 d. 2 s. 4 d. And so of all other, considering moreover, many subtile abbreviations, which happen often times, that are easie to be conceived. As thus 11 s. 3 d. after that I have taken first the $\frac{1}{2}$ for 10 s. Then for 1 s. 3 d. I take the $\frac{1}{4}$ of the product, because 1 s. 3 d. is the $\frac{1}{4}$ of 10 s. in taking the said $\frac{1}{2}$ of the product. And by this meanes, when ye have taken one product, ye may oftentimes upon the same

same take another more briefly then upon the summe that is to be multiplied, which thing you must foresee.

At 11 shil. 3 d.
VVhat 53?

26	10	0
3	6	3
29 lib.	16 shil.	3 d.

At 6 shil. 3 d.
What 58?

14	10	0
3	12	6
18 lib.	2 shil.	6 d.

At 12 shil. 8 d.
VVhat 64?

32	0	8
6	8	0
2	2	8
40 lib.	10 shil.	8 d.

But if you will multiply by pounds, shillings, and pence, being altogether; first, you must wholly multiply by pounds: then take for the shillings & pence, as in the first Rule of this Chapter is plainly declared. And as by examples following may appeare.

At

At 3 lib. 6 shil. 8 d.
VVhat 49 ?

147	0	0
16	6	8

163 lib. 6 s. 8 d.

At 5 lib. 18 shil. 4 d.
VVhat 543 ?

2715	0	0
271	10	0
135	15	0
90	10	0

3212 lib. 15 shil. 0 d.

At 2 lib. 7. shil. 4 d.
What 927 ?

1854	0	0
185	8	0
154	10	0

2193 lib. 18 shil. 0 d.

Rule 9. So these rules doe serve both to buy and sell. As at such a price the ell, the yard, the piece, the pound weight, or any other thing: how much is such a thing, or so many ells worth? Likewise they are very necessary to convert all peices of gold and silver into pounds: for I may as well say, at 4 s. 8 d the French crowns, what are 135 crownes

crownes worth? as to say at 4 s. 8 d. the yard of cloth, what are 135 yards worth?

When any one of the sums which is to be multiplyed, is composed of many denominations: and the other being of one figure alone: then shall ye multiply all the denominations of the other summe by the same one figure, beginning first with that summe which is least in value towards your hand, and bring the product of those pence into shillings, and the product of the shillings into pounds, as by this example doth appeare. *Rule.*

At 3 lib. 9 shil. 8 d. the piece
VVhat?

---

24 lib 7 shil. 8 d.

But (if any of the numbers which are to be multiplied) there be with it a broken number, you must (according to his denominator) take one or many parts of the other number, as need doth require, and set the number which cometh thereof under the products adding the same together. As thus: At 5 l. 7 s. 8 d. the grosse, what shall 34 grosse ½ cost? first you shall multiply 5 li. 7 s. 8 d. by 34 grosse, saying 5 times 34 doe make 170 li. Then for 6 s. 8 d.

8 d. take the $\frac{1}{3}$ of 34 l. which is 11 l. 6 s. 8 d. thirdly, for 1 s. take 34 s. which is 1 l. 14 s. finally, for the $\frac{1}{2}$ grosse you must take $\frac{1}{2}$ of the 5 l. 7 s. 8 d. which is 2 l. 13 s. 10 d. And then adde your 4 products together, so you shall find, that the 34 grosse $\frac{1}{2}$ at 5 l. 7 s. 8 d. the grosse is worth 185 l. 14 s. 6 d. as appeareth in the example following.

At 5 li. 7 shil. 8 d.
What 34 $\frac{1}{2}$?

170 li.	0 shil.	0 d,
11	6	8
1	14	0
2	13	10

185 lib. 14 shil. 6 d.

And as in the last example, you did for the $\frac{1}{2}$ grosse, take halfe of the price (that one grosse was worth) and therefore because 1 grosse is worth 5 l. 7 s. 8 d. the $\frac{1}{2}$ grosse must be worth halfe so much. So likewise if you have $\frac{1}{3}$ of a grosse, or of any other thing, you must take the $\frac{1}{3}$ of the price, that one grosse is worth. And in like manner for the $\frac{1}{4}$ of any thing, you shall take the $\frac{1}{4}$ of the price, also if you have $\frac{1}{5}$, take the $\frac{1}{5}$ of the price that one is worth, and so of all other fractions, as by these examples following doth appeare.

At

At 4 lib. 6 ſhil 8 d.

VVhat 46 ½

184	0	0
15	6	8
2	3	4

201 lib. 10 ſhil. 0 d.

At 8 lib. 0 ſhil. 9d.

VVhat 54 ⅓?

432	0	0
1	7	0
0	13	6
2	13	7

436 lib. 14ſhil. 1 d.

At 3 lib. 16 ſhil, 8 d.

VVhat 17 ¾?

51	0	0
8	10	0
5	13	4
1	18	4
0	19	2

68 lib. 00 ſhil. 10 d.

12. If you will make the proof of theſe rules aforeſaid, you muſt firſt abate the ſumme of money (which the fraction of the multiplication doth import) from the totall ſumme, And divide the reſt of the pounds of

of the said totall summe, by the whole multiplicand the fraction onely excepted. And if any thing do remain after the division is made, that remain shall be multiplyed by 20: and unto the product of that multiplication, you shall adde the shillings which remained of the rest of the totall summe. Again, if any thing doe remaine after the same division, you must multiply the same by 12, and unto the product adde the pence of the totall sum that remained, if any be left. And thus if ye have truly wrought, you shall find again the higher sum of your question, that is to say, the price that one grosse or any other thing is worth, whereof the question is demanded.

Or otherwise reduce the remaine of the totall summe (the value of the money that the fraction is worth being first reduced) all into pence, in multiplying the pounds by 20, and the shillings by 12 and adding thereunto the shillings and pence, which are joyned with the remain of the said totall summe if any such be, then divide those pence by the aforesaid number that is to be multiplyed, the fractions of the same number being also abated. So shall you find the price that one piece, one grosse, or any other thing is valued at; As in the first of the 3

last

last examples going before, where the total summe is 201 l. 10 s. from the which I doe rebate the price of the half crosse which is 2 l. 3 s. 4 d. the rest is 199 l. 6 s. 8 d. which being reduced into pence bringeth 47840 d. I divide the same by 46, and thereof cometh 1040 d. Then I divide that 1040 d. by 12, and they bring 86 s. 8 d. that is to say, 4 l. 6 s. 8 d. which is the price that one grosse, or any other thing did cost as in that first example doth appeare.

The like is to be done of any manner of thing that is sold by the hundred, after 5 score to the hundred.

As thus: at 12 l. 7 s. 6 d. the hundred pounds waight, what shall 374 pounds waight cost? You shall first multiply 12 l. 7 s. 6 d. by 3: that is to say, by three hundred. Then for fifty pound waight you shall take the $\frac{1}{2}$ of 12 l. 7 s. 6 d. because 50 l. is the $\frac{1}{2}$ of 100 l. Likewise for 20 pound waight which is the $\frac{1}{5}$ of 100 l. you shall take the $\frac{1}{5}$ of 12 l. 7 s. 6 d. Lastly, for 4 pound waight you must take the $\frac{1}{5}$ of the last product. This done, you

Rule

At 12 l. 7 s. 6 d.			
What 3 74?			
37	2	6	
6	3	9	
2	9	6	
0	9	10 $\frac{4}{5}$.	
46 l.	5 s.	7 d. $\frac{4}{5}$	

you must adde all these products into one sum, which will make the sum of 46 l. 5 s 7. d $\frac{4}{7}$: as by the example before doth appear.

The proof is made by reducing the total sum into d. And to divide the product by the number that is to be multiplied, that is to say, by 374, likewise divide the quotient produced of that first division by 12: so shall you finde againe the higher sum 12 l. 7 s. 6 d which is the price of a 100 l. waight, as before.

Also the like may be done of our usuall waight here in England (which is 112 l. for every 100 l. waight) in case you know the aliquot parts of a 100, that is to say of 112 l. waight, which are these, 56 l. 28 l. 14 l. & 7 l. For 56 l. is the $\frac{1}{2}$ of 112: 28 l. is the $\frac{1}{4}$ of 112 l. 14 l. is the $\frac{1}{8}$ and 7 l. is the $\frac{1}{16}$.

Therefore for 56 l. take the $\frac{1}{2}$ of the sum of money that the 112 l. waight is worth.

For 28 l take the $\frac{1}{4}$ of the sum of money that the 112 l. is worth.

For 14 l. take the $\frac{1}{8}$ of the sum that the C is worth.

For 7 l. take the $\frac{1}{16}$ of the sum of money that the C is worth.

As thus at 3 l. 6 s. 8 d. the 100 l. waight, that is to say, the 112 l, what shall 24 hun-

dred

dred 3 quarters 21 l. waight cost after the rate?

First, you shall multiply 24 hundred by 3, which is the 3 l. and thereof will come 72 l. then for 6 s. 8 d. which is the $\frac{1}{3}$ of 10 s. you shall take the $\frac{1}{3}$ of 24, which is 8 l. for 24 nobles, maketh 8 l. afterward, for the 3 qu. of the C. you shall first for the 56 l. take the $\frac{1}{2}$ of 3 l. 6 s. 8 d. because 56 l. is the $\frac{1}{2}$ of the C. and thereof cometh 1 l. 13 s. 4 d. then for 28 l. (which is the quarter of a C.) you shall take the $\frac{1}{4}$ of 3 l. 6 s. 8 d. or else the $\frac{1}{2}$ of the product, which cometh last of 56 l. which is 16 s. 8 d. likewise for 14 l. you must take the $\frac{1}{8}$ of 3 l. 6 s. 8 d. which is 8 s. 4 d. or else the $\frac{1}{2}$ of the product that cometh of 28 l. which is all one. Finally, for 7 l. take the $\frac{1}{16}$ of 3 l. 6 s. 8 d. or else the $\frac{1}{2}$ of the last product that cometh of 14 l. and thereof cometh 4 s. 2 d. Then adde all these products together: and the totall sum will be 83 l. 2 s. 6 d. so much are the 24 C. 3 qu. and 21 l. waight worth after 3 l. 6 s. 8 d. the C. as appeareth in the margent.

At 3 li. 6 shil. 8 d.		
What 24 C. 3. q. 21 l.		
72	0	0
8	0	0
1	13	4
	16	8
	8	4
	4	2
83 l. 2 shil. 6 d.		

The proof hereof is made, like to the other proofs aforesaid, saving, that where in those proofs you abate the price of the money, that the fraction was worth, from the total summe; here in this example (and in such other like) you must abate the price of the money, that the odde waight amounteth unto (over and above the just hundreds) from the total summe; the rest thereof shall you convert into pence, dividing the product of the multiplication by the just number of the number of the hundreds, so shall you finde the pence, that one hundred is worth: which you shall bring into pounds by the order of division, and so of all other.

Chap. 2.

Of the Rule of Three composed, the which is distinct into Foure Rules, each of them differing, the one from the other

There belongeth to the first and second parts of the Rule of Three composed alwaies 5 numbers: whereof (in the first part of the Rule of three composed) the second number and the first, are always of one semblance and like

like denomination: whose rule is thus. You must multiply the first number by the second, and that shall be your diuisor, then multiply the other three numbers the one by the other to be your dividend. *Rule 1.*

Example of this first part, if 100 Crownes in 12 Months doe gaine 15 l. what will 60 Crowns gain in 8 Months? Answ. First multiply 100 Crowns by 12 months, and thereof cometh 1200 for your diuisor, then multiply 15 l. by 60 Crowns, and by 8 months, and you shall have 7200; wherefore diuide 7200 by 1200, and thereof cometh 6 l. so many l. will 60 Crowns gain in 8 months: this Question may be done by the double Rule of three, that is to say, by the Rule of Three at two times. But yet this Rule of three composed is more brief.

Crowns.	Months.	Pounds.	Crowns.	Months
100	12	15	60	8

x

7200

12|006 lib.

2. In the second part of the Rule of Three composed, the 3 number is like unto the fift, whereof the rule is thus, you must multiply the third number by the 4, and the product shall be your diuisor, then multiply *Rule 2.*

the first number by the second, and the product thereof by the fift, the which number shall be your dividend, or number that is to be divided: as by example.

When 60 crowns in 8 months doe gain 6 l. in how many months will 100 crowns gaine 15 l. Answer. Multiply the third number 6 by the fourth number 100: and thereof cometh 600 which shall be your divisor: then multiply the first number 60 by the second number 8 and the product thereof by the fift number 15 and thereof will come 7200: then divide 7200, by 600, and the quotient will be 12, in so many months will 100 crowns gaine 15 l. This question may likewise be done by the Rule of 3, at 2 times.

Crown.	Months.	Pounds.	Crowns.	Pounds.
60	8	6	100	15

x

7200 Months,
6600 (12

In the third part of the Rule of Three composed there may be 5 numbers, or more: and in this rule the first number & the last are alwaies dissemblant and of unlike denomination, the one to the other: and the

question

question is from the last number unto the first, whereof the Rule is thus, You must multiply that number which you would know by those numbers which do give the value, and divide the product of the same by the multiplication of the numbers which are already valued, as by example. If 4 deniers Parisis be worth 5 deniers Tournois, and 10 deniers Tournois, be worth 12 deniers of Savoy, I demand how many deniers Parisis are 8 deniers of Savoy worth? Ans. Multiply 8 deniers of Savoy (which is the number that you would know) by 4 deniers Parisis and by 10 deniers Tournois which are the numbers that give the value, and they make 320: then multiply 5 deniers Tournois, by 12 deniers of Savoy, which are the numbers already valued, and they make 60: Finally divide 320 by 60, and you shall finde 5 deniers $\frac{1}{3}$ Parisis, so much are the 8 deniers of Savoy worth. Rule

Parisis.	Tournois.	Tournois.	Savoy.	Savoy.
4d,	5d.	10d.	12d.	8.
320 par.				
60 (5d. $\frac{1}{3}$.				

In the 4th part of the Rule of 3 composed: the first number & the last are always

semblant and of one denomination, and the question of this rule, is alwaies from the last number to that last saving one, where-
Rule 4. of there is a rule which is thus: You must multiply the number which you would know, by the numbers that are already valued, & divide the product of the same, by the multiplication which cometh of the numbers that give the value, as by example.

If 4 deniers Parisis, be worth 5 deniers Tournois, and 10 deniers Tournois, be worth 12 deniers of Savoy: I demand how many deniers of Savoy, are 15 deniers Parisis worth? Answ. Multiply 15 deniers Parisis that you would know, by 5 deniers Tournois, and by 12 deniers of Savoy, which are the numbers already valued, and they make 900. Divide the same by 4 times 10, which are the numbers that do give the value, that is to say by 40, and you shall finde 22 deniers $\frac{1}{2}$ of Savoy: so much are the 15 deniers Parisis worth.

Parisis.	Tournois.	Tournois.	Savoy.	Parisis.
4d.	5d.	10d.	12d.	15d.

12	
60	o Savoy.
440	o 22d. $\frac{1}{2}$

The

The third Chapter treateth of Queſtions of the trade of Merchandize, in the which is taught the Rule of Three in Fractions, beginninng at the Queſtion following.

IF 31 Dezenth. Dozens, doe coſt me 100 l. 15 s. what ſhall 4 Dozens coſt after the ſame rate? Anſw. Firſt bring the 100 l. 15 s. all into ſhil. in multiplying the 100 l. by 20, and adding to the product the 15 s. and thereof cometh 2015 s. then multiply 2015 by the third number 4 and divide the product by 31, and the quotient will be 260 s., The which divide again by 20, and thereof cometh 13 l. And ſo much are the the 4 Dozens worth.

Dozens.	Lib.	ſhil.	Dozens.
31	100	15	4
	20		
	2015		
	4		
	8060		

x
28
8060 (260
xxx
33

If 4 dezens be worth 13 l. what are 31 dezens worth by the price? Ans. Multiply 31 by 13, and thereof cometh 403. The which you shall divide by 4, and thereof cometh 100 l. $\frac{3}{4}$ which $\frac{3}{4}$ are 15 s. and so much are 31 dozens worth, as before.

Dozens.	Lib.	Dozens
4	13	31
		13
		93
		31
		403

403

444 (100 l. $\frac{3}{4}$. 4

3. If 49 Elles be worth 2 l. 4 s. 11 d. what are 18 Elles worth by the price? First you must bring 2 l. 4 s. 11 d. all into pence, in multiplying 2 l. by 20 maketh 40: adde thereto 4 shi. they make 44 shil. the which multiply by 12 d. and they make 528 d. whereunto adde 11 d. all is 539 d. the which 539 d. must be your second number in the Rule of Three, then multiply 539 by the third number 18, and thereof cometh 9702, divide the same by 49, and you shall have in your quotient 198 d. the which divide by 12, and you shall finde

16

16 ſhil. 6 pence: ſo much are the 18 Elles wo3th.

Elles.	lib.	ſhil.	d.	Elles
49	2	4	11	18
	20			539
	44			18
	12			4312
	88			539
	441			9702
	1			

539

x3	x
427	76
586	x98 (16 ſhil. 6 d.
9702	xzz
4999	x
44	

4. If 18 Elles be wo3th 16 s. 6 d. what are 49 Elles wo3th by the p3ice? Anſwer. W3ing 16 s. 6 d. into pence in multiplying 16 by 12, and thereof cometh 198 d. with the 6 d. added to it, then multiply 198 d. by 49, the p3oduct will be 9702. The which divide by 18 Elles, and thereof cometh 539. Then divide 539 by 12, and the p3oduct thereof by 20: So ſhall you have

2 li.

2 l. 4 s. 11 d. and ſo much are the 49 Elles worth.

Elles.	ſhil.	d.	Elles.
18	16	6	49
	12		198
	32		392
	166		441
	198		49
			9702

17 446 9702 (539 x888 xx

1 x5x 539 (44 ſhil. xzz x

Note that whereas in the firſt part of this Book, I have ſet forth the Rule of Three both in whole numbers, and alſo in fractions: Now I will ſhew you how to do the ſaid Rule of Three in fractions more at large. And becauſe I would have you to underſtand the ſame generally, you muſt firſt conſider if the three numbers that ſhall be propounded (in any queſtion of the ſaid Rule of Three) be all Fractions, yea or no: which if they be all three numbers fractions, then muſt you worke as followeth.

Firſt, you muſt multiply the Numera-

tors

tors of the ſecond and third fractions in your Rule of three, the one by the other, and again you muſt multiply that product, by the denominator of the firſt fraction: and the number which cometh of this laſt multiplication, ſhall be your dividend, or number that muſt be divided.

Secondly you muſt multiply likewiſe the Denominators of the ſecond and third fractions in your ſaid Rule of Three, the one by the other, and the off-come again by the numerator of the firſt fraction. And the number which is produced of that multiplication, ſhall be your diviſor.

Thirdly, you muſt divide the aforeſaid dividend by the diviſor, and the quotient will be the anſwer to the queſtion, as by Examples ſhall hereafter appeare.

But if you finde whole numbers and fractions together, in the ſaid Rule of Three: you muſt firſt reduce the ſame into their fractions by the firſt Reduction.

Likewiſe if you finde any of the three numbers in your Rule of 3, to be whole numbers, alone without any fraction joyned with it, you muſt in this caſe put 1 under the ſame whole number with a line betweene them both: The which 1 doth repreſent the denominator to the ſame whole number,

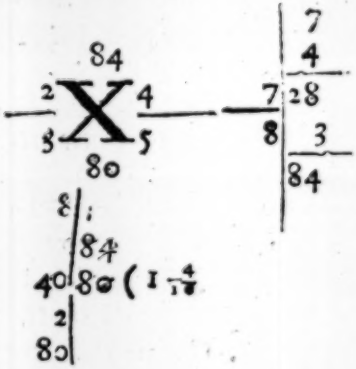
number, and then you must proceed to worke the Rule of Three in like manner, as though they were all fractions: as before is said.

The Examples of all three differences aforesaid doe follow in the Three next Questions orderly.

IF $\frac{2}{3}$ X. $\frac{4}{5}$ $\frac{7}{8}$: I do understand thereby thus as followeth: If $\frac{2}{3}$ of any waight, or measure be worth $\frac{4}{5}$ of 20 s. or of any other sum, what are $\frac{7}{8}$ of the like waight or measure worth after the rate? Answ. First, as is said before, I doe multiply the Numerators of the second and third fractions, the one by the other: that is to say, 7 by 4, and they make 28: againe, I do multiply the said 28 by the denominator of the first fraction, that is to say, by 3, and thereof cometh 84 the which 84, I set over the crosse for my dividend. Secondly, I doe multiply the Denominators of the second and third Fractions the one by the other: Namely 8 by 5, and they make 40: again I doe multiply the said 40 by the Numerator of the first Fraction: that is to say, by 2, and thereof cometh 80, the same 80 I doe set under the crosse for my Divisor. Then I divide 84 by 80, and there cometh

in

in the quotient 1 l. and $\frac{4}{10}$ remaining, the which $\frac{4}{10}$ being abbreviated, maketh $\frac{1}{25}$ of a pound, which is worth 12 d. And so much will the aforesaid $\frac{7}{8}$ cost, as by the worke following, doth appeare.



6. If $\frac{2}{5}$ of an Ell of any merchandize do cost me 12 s, 7 d. the which 7 d. doth make $\frac{7}{12}$, what will $\frac{9}{10}$ of an Ell cost me after the same rate? Answer. First I set down my numbers as followeth. If $\frac{2}{5}$ X 12 $\frac{7}{12}$, $\frac{9}{10}$ Then by the 6 Reduction I reduce 12 $\frac{7}{12}$ all into Twelves, and they make $\frac{151}{12}$ for the second number in my Rule of 3, which must stand in the place of 12 $\frac{7}{12}$. And then will my three numbers stand thus as followeth, $\frac{2}{5}$ X $\frac{151}{12}$. $\frac{9}{10}$. Then I multiply 151 by 9, and the off-come by 5, and thereof

comety

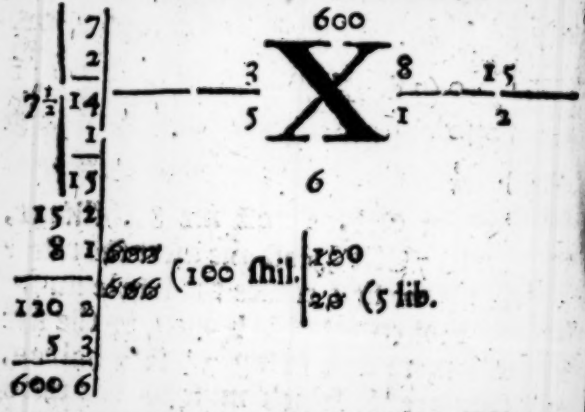
cometh 6795, the which I doe ſet over the croſſe for my dividend. Likewiſe I multiply 12 by 10, and the off-come by 2, and thereof cometh 240: which I doe ſet under the croſſe for my diviſor. Then I divide 6795, by 240: and thereof cometh in the quottent 28 s. & 75 remaining, the which 75, becauſe it is the remaine of s. I do multiply it by 12 d. for that there is 12 d. in a s. and thereof cometh 900. The ſame 900, I divide againe by 240, & thereof cometh 3 d. and 180 remaining, which 180 I do ſet apart over 240, with a line betweene them both, and they are $\frac{180}{240}$. The which being abbrevied, doe make $\frac{3}{4}$ of a d. And thus I finde that the $\frac{2}{5}$ of an Ell ſhall coſt 28 s. 3 d. $\frac{3}{4}$, as appeareth.

151	12	
	12	6795
7	24	$\frac{2}{5} \times \frac{151}{12} \quad \frac{9}{10}$
12	127	240
	151	
151	12	
9	10	3
1359	120	287
5	2	6795. (28 ſhil.
6795	240	2400
		24

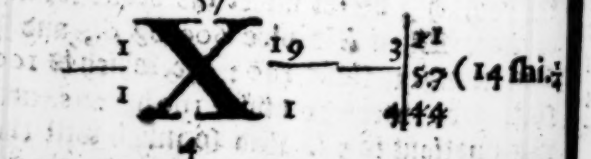
75

75 | 1
12 | 38
959 | 960 (3 d. $\frac{12}{240}$.
70 | 240
900 | $\frac{3}{4}$

If $\frac{3}{7}$ of an Ell doe cost me 8 shillings, what will 7 Ells $\frac{1}{2}$ cost me after the rate? Answer. I doe first reduce the whole number and broken into his broken, by the first Reduction, that is to say $7\frac{1}{2}$ into halves, and they are $\frac{15}{2}$, which must be the third number in my rule of three, the second number is 8 shillings, but I must (as before is taught) put 1 under 8 with a line between them, to make it like a fraction thus, $\frac{8}{1}$. Then must my three numbers in my Rule of three, stand after this manner: $\frac{3}{7}$ X $\frac{8}{1}$ $\frac{15}{2}$. Then I do multiply 15 by 8, & the product thereof by 5, amounteth 600: The which I doe set over the crosse, for my dividend. Likewise I doe multiply 2 by 1, and the product thereof by 3, and thereof cometh 6, the which I do set under the crosse for my divisor. Then I divide 600 by 6., and I find in my quotient 100: the which is 100 shil. I do therefore divide 100 by 20 s. and my quotient is 5 l. And so much will the 7 Ells $\frac{1}{2}$ cost me, as hereafter doth appear.



If one yard of Velvet coſt 19 ſhillings, what ſhall ¾ of a yard coſt? Anſwer. Set down your numbers thus: If 1/1 X 19/4. Then multiply 1 times 19, by 3: and thereof cometh 57 for your dividend, or number to be divided: the which 57 you ſhall divide by 1 times 1, 4 times, which are 4, and your quotient will be 14 s. 1/4, which ¼ is worth 3 d. ſo much are the ¾ of a yard worth after 19 ſhillings the yard, as by practice followeth.



Or otherwiſe by the rules of practice: firſt,

first, for $\frac{3}{4}$ of a yard which is $\frac{1}{2}$ of a yard, you must take the $\frac{1}{2}$ of 19 shillings. which is 9s. 6 d. then for $\frac{3}{4}$ of a yard take the $\frac{1}{3}$ of the product, that is to say, of 9s. 6 d. and thereof cometh 4s. 9 d. adde these numbers together, and you shall have 14 s. 3 d. as above is said, and as appeareth here in the margent.

19 shil.	
9 shil.	6 d.
4	9
14	3

9 If $\frac{3}{4}$ of a yard of Velvet doe cost 14s. 3d. what shall 1 yard cost? Answer. Set your numbers down thus: If $\frac{3}{4}$ X $14\frac{1}{4}$ $\frac{1}{1}$. Reduce $14\frac{1}{4}$ into a fraction, and they will be $\frac{57}{4}$. then multiply 57 by 1, 4 times, and thereof cometh 228 for your dividend. Likewise multiply 1 times 4. 3 times, and thereof cometh 12 for your divisor: then divide 228 by 12 and your quotient will be 19. so much is the yard of Velvet worth.

228

3 X 57 — 1 | x

4 X $14\frac{1}{4}$ — 1 | x

12 | x 228 (19 shil.

| x x x

| x

Or otherwise by the Rule of practice: you shall take the $\frac{1}{3}$ part of 14 shillings 3 d.

which is 4 s. 9 d. and adde it with the same 14 s. 3 d. and you shall have 19 shillings, as before.

14 shil.	3 d.
4	9
19 shil.	0 d.

10 If one Ell of Holland cloth be worth 5 s. what are $\frac{2}{3}$ worth after the rate? Ans. Say thus, if $\frac{1}{1}$ X $\frac{5}{1}$ $\frac{2}{3}$. Then multiply 2 times 5, one time, and thereof cometh 10 for your dividend: likewise multiply 3 times 1, one time, they make 3 for your divisor; then divide 10 by 3, and thereof commeth 3 s. $\frac{1}{3}$, which $\frac{1}{3}$ is worth 4 d, and so much are the $\frac{2}{3}$ of an Ell, worth.

$$\frac{\overset{10}{\cancel{1}}}{\underset{3}{\cancel{1}}} \times \frac{\overset{5}{\cancel{1}}}{\cancel{1}} \qquad \begin{array}{r|l} 2 & 1 \\ & \cancel{10}\ 3\text{ shil. } \frac{1}{3} \\ 3 & \cancel{3} \end{array}$$

Or otherwise, by the rule of practice take first the $\frac{1}{3}$ of 5 s. for the $\frac{1}{3}$ of an Ell, and that is 1 s. 8 d. likewise, for the other $\frac{1}{3}$ of an Ell, take again another $\frac{1}{3}$ of 5 s. which is also 1 shilling, 8 pence, and adde them together, and so shall you have 3 s. 4 d. as before.

shil.

5 shil.	
1	8
1	8
3 shil.	4 d.

11 If $\frac{2}{3}$ of an Ell of Holland cloth doe cost me 3 s. 4d. what shall 1 Ell cost? Ans. Set down your numbers thus: if $\frac{2}{3}$ X $3\frac{1}{3}$. $\frac{1}{1}$. First, reduce $3\frac{1}{3}$ all into thirds, and it will be $\frac{10}{3}$. Then multiply 1 times 10, 3 times, and thereof cometh 30 for your dividend. Likewise multiply 1 times 3, 2 times, and your divisor will be 6, then divide 30 by 6, and you shall have 5 s. so much is the Ell of Holland cloth worth.

$$\frac{2}{3} \overset{30}{\underset{6}{\times}} \frac{10}{3\frac{1}{2}} \qquad 1 \qquad \frac{\cancel{30}}{\cancel{6}} (5 \text{ shil.}$$

Or otherwise by practice, take the $\frac{1}{2}$ of 3s. 4 d. which is 1 shilling 8 pence, and adde it to the same 3 shillings, 4 d. and thereof will come 5 s. as before. For the $\frac{1}{3}$ of 5 s. is as much as the $\frac{1}{2}$ of 3 s. 4 d. which was the price that the $\frac{2}{3}$ of an Ell did cost, as appeareth.

3 shil.	4 d.
1	8
5 shil.	0 d.

12 if one Ell coſt me 17 s. what ſhall 15 Ells $\frac{1}{4}$ part coſt? which $\frac{1}{4}$ is halfe a quarter of an Ell. Anſwer. Say if $\frac{1}{1}$ X $\frac{17}{1}$ $15\frac{1}{4}$. Firſt, reduce $15\frac{1}{4}$ into eight parts, and they make $\frac{121}{8}$ then multiply 121 by 17, 1 time and thereof cometh 2057, for your dividend. Likewiſe multiply 8 times 1, 2 time, and the product will be 8, for your diviſor, then divide 2057 by 8, & you ſhall find 257 s. $\frac{1}{8}$, which is 12 l. 17 s. 1 d. $\frac{1}{2}$ ſo much are the 15 Ells $\frac{1}{4}$ worth as by practice both appear in the example following.

$$\frac{1}{1} \times \frac{17}{1} = \frac{2057}{8} \qquad 15\frac{1}{8} = \frac{121}{8}$$

Or otherwiſe, for 10 s. take the $\frac{1}{2}$ of 15 which is 7 l. 19 s. then for 5 s. take the $\frac{1}{2}$ of 7 l. 10 s. which is 3 l. 15 s. Thirdly, for 2 s. take the $\frac{1}{5}$ of 7 l. 10 s. becauſe the $\frac{1}{5}$ of 10 s. is is 2 s. Fourthly, for the $\frac{1}{8}$ of the Ell, you ſhall take the $\frac{1}{8}$ of 17 ſhillings, which is 2 ſhillings 1 peny, $\frac{1}{2}$.

Then adde all theſe ſums together, and you ſhall find 1 li. 17 s. 1 d. $\frac{1}{2}$

$15\frac{1}{8}$
17

7	10	0
3	15	0
1	10	0
	2	$1\frac{1}{2}$
12 li.	17 ſhil.	1 $d\frac{1}{2}$

ag

as before, and as appeareth more plainly in the former practice.

13 If 25 Elles be worth 2 l. 3 s. 4 d. what are 18 Ells $\frac{1}{4}$ worth by the price? Answer. First, put 3 s. 4 d. into the part of a l. and you shall have $\frac{1}{6}$: then say if $\frac{25}{1}$ give me 2 l. $\frac{1}{6}$ what shall 18 $\frac{1}{4}$ give? put the whole numbers 6 into their broken and then multiply 1 times 13 by 75, the product will be 975, the which you shall divide by 25 times 6, 4 times: which maketh 600. Then divide 975 by 600: and your quotient will be 1 l. and 375 will remain, the which 375 you shall multiply by 20, and thereof will come 7500, divide the same by 600, your quotient will be 12 s. and 300 will remain, the which abbrevied is $\frac{1}{2}$ which is 6 d: thus the 18 Ells $\frac{1}{4}$ are worth 1 l. 12 s. 6 d. as by practice will appeare.

13	75
$\frac{25}{1}$ X 2 $\frac{1}{6}$	18 $\frac{1}{4}$.

Or otherwise by the rules of practice, for because that 12 Ells $\frac{1}{2}$ is the $\frac{1}{2}$ of 25 Ells, therefore take the $\frac{1}{2}$ of 2 l. 3 s. 4 d. which is 1 l. 1 s. 8 d. then for 6 Ells $\frac{1}{4}$ take the $\frac{1}{4}$ of 2 l. 3 s. 4 d. or else the $\frac{1}{4}$ of the last product, (that is to say, of 1 l. 1 s. 8 d.) which is all

one, and adde them together, so shall you have 1 l. 12 s. 6 d. as before.

lib.	shil.	d.
2	3	4
1	1	8
	10	10
1 lib.	12 shil.	6 d.

14 If 15 yards be worth 32 s. what are half a yard and half a quarter, or else $\frac{5}{8}$ of a yard worth? Answer. Say if $\frac{15}{1}$ give $\frac{32}{1}$, what will $\frac{5}{8}$ give? Multiply 1 times 32 by 5 and divide the product by 15 times 8 times, and your quotient will be 1 : and $\frac{40}{120}$ remaining, which is $\frac{1}{3}$ of a shilling, that is to say 4 d. and so much are the $\frac{5}{8}$ of a yard worth, that is to say 1 s. 4 d.

$$\frac{15}{1} \text{ X } \frac{32}{2} \frac{5}{8}$$

Or otherwise, see what the yard is worth after the manner aforesaid in the other examples, and you shall find that the yard is worth 2 s. 1 d. $\frac{3}{7}$: of the which number take first the $\frac{1}{2}$ for $\frac{4}{8}$, which is 1 s. 0 d. $\frac{4}{8}$ of the which number, take the $\frac{1}{4}$ for the other $\frac{1}{8}$, which is 3 d. $\frac{1}{7}$, adde these two numbers together, and you shall find the $\frac{5}{8}$ to be worth 1 s. 4 d. as is before said.

5 shil.

2 shil.	1 d.	$\frac{3}{5}$
1	0	$\frac{4}{5}$
	3	$\frac{1}{5}$
1 shil.	4 d.	0

15 If 13 Ells $\frac{5}{6}$ be worth 27 shillings, what are 10 Ells $\frac{2}{3}$ worth by the price? Answer. Say if $13\frac{5}{6}$ give $\frac{27}{1}$, what shall $10\frac{2}{3}$ give? Put the whole numbers into their broken and you shall find $\frac{83}{6}$ $\frac{27}{1}$, and $\frac{2}{3}$. Then multiply 6 times 27. by 32, and thereof cometh 5184, the which number you shall divide by 83 times, 1, 3 times, and you shall find 20 shillings $\frac{61}{83}$, which fraction is worth 8 d. $\frac{60}{83}$ parts of a peny.

83	32
$13\frac{5}{6}$ X $\frac{27}{1}$	$10\frac{2}{3}$.

16 If 2 yards $\frac{1}{2}$ be worth 4 s. 8 d. what are 8 yards $\frac{1}{4}$ worth? Answer. Put the 8 d. into the part of a s. setting 8 over 12 and it will be $\frac{8}{12}$ which abbrevied are $\frac{2}{3}$, then reduce whole numbers into 3 broken, and they still stand thus: $\frac{5}{2}$ $\frac{14}{3}$ $\frac{33}{4}$, then multiply 2 times 14 by 33, and divide the product by 5 times 3, 4 times: and you shall find 15 s. and $\frac{24}{60}$ will remain which are worth 4 pence $\frac{4}{5}$, so much are the 8 yards $\frac{3}{4}$ worth.

5	14	33
$2\frac{1}{7}$	$4\frac{1}{7}$	$8\frac{1}{4}$

17 If 1 kersy be worth 2 l. 6 s. 8 d. how many kerseys shall I buy for 36 l. 3 s. 4 d. after the rate? Answer. Put 6 s. 8 d. into the part of a l. and you shall have 2 l. $\frac{1}{3}$, for the first number in the rule of three, and 1 kersey for the second number: then put 3 s. 4 d. into the part of a l. and it is $\frac{1}{6}$, so you shall have 36 l. $\frac{1}{6}$ for the third number, then will your three numbers in the rule of three stand thus: $2\frac{1}{3} \times \frac{1}{1}$. $36\frac{1}{6}$. Then reduce the whole numbers into their broken, and it will be thus $\frac{7}{3} \times \frac{1}{1}$ $\frac{217}{6}$, then multiply three times 1 by 217, and thereof will come 651 for your dividend. Likewise multiply 7 times 1 by 6: and the product thereof will be 42. Then divide 651 by 42, and you shall find $15\frac{1}{2}$. So many kersies of 2 l. 6 s. 8 d. the piece, shall you have for 36 l. 3 s. 4 d.

7	117
$2\frac{1}{3} \times \frac{1}{1}$	$36\frac{1}{6}$

Of

CHAP. IV.

Of losses and gaines in the trade of Merchandize.

1 IF 13 yards $\frac{1}{3}$ be worth 22 pounds 10 s. how much shall I sell 1 yard to gain $\frac{4}{1}$, or to make 3, 4? which is all one. Answer. Say by the rule of Three, if 3 doe yield 4. what will 22 $\frac{1}{2}$ yield? multiply and divide and you shall find 30 l. Then say again by the rule of Three, if 13 yards $\frac{1}{3}$ doe give 30 l. as well of principal, as of gain: what will 1 yard be worth by the price? Multiply and divide, and you shall find 2 l. 5 s. and for that price must the yard be sold to gain the $\frac{1}{3}$, or to make of 3, 4.

180

45 | 180

$\frac{3}{1}$ $\frac{4}{1}$ 22 $\frac{1}{2}$ | 66 (30

6

90

40

13 $\frac{1}{3}$ X $\frac{30}{1}$ $\frac{1}{1}$.

40

Or otherwise, take the $\frac{1}{3}$ part of 22 li. 10 s. which is 7 l. 10 s. that shall you adde with 22 li. 10 s. and you shall have

	lib.	shil.
have 30 l. as be-		
fore. Then divide	22	10
30 by 13 $\frac{1}{3}$ and you	7	10
shall find 2 l. 5 s.	30	00

as above is said.

2 If one yard be worth 27 s. 6 d. for how much shall 16 yards $\frac{2}{3}$ be sold to gain 2 shillings upon the pound of money? that is to say, upon 20 s.? Answer. Adde 2 s. unto 20 and you shall have 22, then say: If 20 s. principal do give 22 s. principal and gain: how much will 27 s. 6 d. principal yield? Multiply and divide, and you shall find 30 s. $\frac{1}{4}$: Then say again by the rule of three. If one yard doe give me 30 s. $\frac{1}{4}$ (which is as well the principal as the gain) what shall 16 yards $\frac{2}{3}$ give me? Multiply and divide, and you shall find 25 l. 4 s. 2 d. For the same price shall the 16 yards $\frac{2}{3}$ be sold, to gain after the rate of 2 s. upon the l. of money, or upon 20 s. which is all one.

55	121	50
$\frac{20}{1}$ X $\frac{22}{1}$ 27 $\frac{1}{2}$	$\frac{1}{1}$ X 30 $\frac{1}{4}$	16 $\frac{2}{3}$

3 If 10 yards $\frac{2}{3}$ be worth 25 l. 10 s. for how much shall 2 yards $\frac{1}{4}$ be sold, to gain after 10 l. upon the 100 l. of money? Answ. Say if 100 principal yield 110, as well principal as gain, how much will 25 pound,

10

10 shillings yield me? Multiply and divide and you shall find 28 l. 1 s. Then say, if 10 yards $\frac{2}{3}$ doe yield me 28 l. 1 s. as well principal as gain, how much shall 2 $\frac{1}{4}$ yield me? Multiply and divide, and you shall finde 5 l. 18 s. 4 d. $\frac{1}{12}$. and for so much shall the 2 yards $\frac{1}{4}$ be sold, to gain after 10 l. upon the 100 l. of money.

	51
$\frac{100}{1}$ X $\frac{110}{1}$.	25 $\frac{1}{2}$.
32 561	9
10 $\frac{2}{3}$ X 28 $\frac{1}{10}$.	2 $\frac{1}{4}$.

And although that in these questions of gain and losse, sometimes the first number is not like unto the third number, that is to say, of the same denomination, for whereas one would say, if 20 s. gain 2 s. what shall 50 l. gain? or what shall 25 l. gain? &c. Or if 20 l. doe gain 2 l. what shall 15 s. gain? or what shall 27 s. $\frac{1}{2}$ gain? Yet the same doth not prove that the rule is therefore false. For if 20 s. do gaine 2 s. 20 l. shall gain 2 l. and 20 d. shall gain 2 d. likewise 20 crowns, shall gain 2 crownes, and so of all other. Therefore it is to be understood, that the first number of the rule of three in these reasons, is purposed

les to be semblable or like to the third in quality or name.

When one Merchant selleth wares to another, and he giveth to the buyer 2 upon 15: how much shall the buyer gain upon the 100, after the rate?

Answ. First, adde 2 unto 15, and they are 17, they say, if 15 give 17, what shall 100 give? Multiply and divide and you shall find $15\frac{1}{3}$ so the buyer getteth after the rate of $13\frac{1}{3}$ upon the 100.

151 | 17 : | 100.

4. If one Northerne dozen cost me 3 l. 5 s. I sell the same again for 3 l. 12 s. 6 d. how much doe I gain upon the pound of money after the rate? Answer. Say if 3 l. $\frac{1}{4}$ doe give 3 l. $\frac{1}{4}$ what shall $\frac{20}{1}$ give? put the whole number into their broken and you shall have $\frac{1}{4} \times \frac{3}{4} \frac{20}{1}$, then multiply 4 times 29, by 20 and thereof cometh 2320: for your number that is to be divided: likewise multiply 13 times 8, 1 time, and thereof cometh 104. Then divide 1320, by 104 and you shall find 22 shillings, $\frac{4}{13}$. So I shall get 2 s. $\frac{4}{13}$ upon 20 s or upon the pound of money

12 29

$3\frac{1}{4} \times 3\frac{5}{4} \frac{20}{1}$ 5 If

5. If a yard of cloth cost me 7 s. 8 d. and afterward I sell of the same cloth 13 yards $\frac{1}{4}$ for 4 l. 13 s. 4 d. I would know whether I do win or lose, and how much upon the 100 l. of money? Answer. Set first at 7 s. 8 d. the yard what the 13 yards $\frac{1}{4}$ shall cost, and you shall find 5 l. 1 s. 7 d. And I sold the same but for 4 l. 13 s. 4 d. so that I doe lose upon the 13 yards $\frac{1}{4}$, the sum of 8 s. 3 d. Then if you will know how much is lost in the 100: Say by the rule of three, if 5 l. 1 s. 7 d. do. lose 8 s. 3 d. what will 100 l. lose? First, put 1 s. 7 d. into the part of a l. and it will be $\frac{19}{240}$. Likewise put 8 s. 3 d. into the part of a l. and it is $\frac{33}{80}$. Then will your numbers stand thus: $5\frac{19}{240} \times \frac{33}{80} \frac{100}{1}$, reduce the whole into his broken, and then multiply and divide, so you shall find 8 l. $\frac{1219}{97512}$, which fraction is worth 2 s. 5 d. $\frac{189}{12199}$, and so much is lost in the 100 l. of money.

$$\frac{1219}{5\frac{19}{240} \times \frac{33}{80} \frac{155}{1}}$$

6. More, If 12 yards $\frac{1}{2}$ of scarlet, be sold for 30 l. 15 s. upon the which is gained after the rate of 11 $\frac{1}{9}$ upon the 100: I demand what the yard did cost at the first? Answ. from 30 l. 15 s. subtract his $\frac{1}{10}$ part, which is 3 l. 1 s. 6 d. and there resteth 27 l. 13 s.

s. 6 d. the which number multiplyed by 2, bringeth 55 l. 7 s. of the which number take the $\frac{1}{5}$, which is 11 l. 1 s. and 4 d. and $\frac{4}{5}$. Then take again the $\frac{1}{5}$ of the said 11 pound, 1 shilling 4 d. $\frac{4}{5}$, which is 2 l. 4 shillings 3 pence. $\frac{2}{25}$, and so much did the yard cost at the first penny.

30 lib.	15 shil.	0 d.
3	1	6
27	13	6
2	0	0
55	7	0
11	1	$4\frac{4}{5}$
2 lib.	4 shil.	3 d. $\frac{2}{25}$

¶ More, if 15 yards $\frac{1}{4}$ of scarlet, doe cost me 32 l. 13 s. 4 d. And I sell the yard again for 2 l. whether doe I win or lose, and how much in or upon the pound of money?

Answer. Look what the 15 yards $\frac{1}{4}$ are worth at 2 l. the yard, and you shall finde that they are worth 31 l. 10 s. But they did cost 32 l. 13 s. 4 d. so that there is lost upon the whole, 1 l. 3 s. 4 d. Then to know how much is lost in the l. say by the rule of three, if 32 l. do lose 1 l. $\frac{1}{3}$ what will $\frac{1}{1}$ lose? that is to say, what will 1 pound lose? reduce the whole numbers into their broken

and

and then multiply 1 and divide, ſo ſhall you finde $\frac{21}{240}$ parts of a l. Then multiply 21 by 240 d. becauſe ſo many pence are in a l. and divide the product by 588, and you ſhall finde 8 d. $\frac{336}{588}$. which being abbreviated, doe make $\frac{4}{7}$, and thus you ſee, that 8 d. $\frac{4}{7}$, is loſt in the l. of money.

$$\frac{98}{32\frac{2}{3} \times 1\frac{1}{6}\frac{1}{1}} \quad \frac{7}{}$$

8. If 1 yard of cloth of tiſſue, be ſold for 3 l. 15 s. whereupon is loſt after the rate of 10 d. in the 100 : I demand what 12 yards $\frac{1}{2}$ of the ſame tiſſue did coſt? Anſwer Adde unto 3 l. 15 s. his own $\frac{1}{10}$ part, which is 7 s. 6 d. and all amounteth to 4 l. 2 s. 6 d. then look what the 12 yards $\frac{1}{2}$ will amount unto, after 4 l. 2 s. 6 d. and you ſhall finde that they will come to 51 l. 11 s. 3 d. ſo much did the 12 yards $\frac{1}{2}$ coſt.

3 l.	15 ſhil.	0 d.
	7	6
4 l.	2 ſhil.	6 d.

12	$\frac{1}{2}$	
4 l.	2 ſhil.	6 d.
48	60	0
1	10	0
2	01	3
51 l.	11 ſhil.	3 d.

9. More, if I ſell one Wiltſhire white for 6 l. 12 s. whereupon I doe gain after the rate of 2 s. upon the l. of money:

that is to ſay, upon 20 s. I demand what 11 pieces of the ſame whytes did coſt me? Anſwer. From 6 l. 12 s. (which is 132 s.) you ſhall ſubſtract his $\frac{1}{11}$ part, that is to ſay, 12 s. & there will remain 120 s. of 6 l. Then ſée at 6 l. the cloth, what the 11 clothes are worth, and you ſhal find that they are worth 66 l. And ſo much did the 11 clothes coſt.

132 ſhil.	11
12 ſhil.	6
120 ſhil.	66 l.

1. If I ſell 10 ells $\frac{1}{2}$ of Holland for 22 s. 9 d. whereupon I do loſe after the rate of 2 s. in the l. of money I demand what the ell did coſt me? Anſwer. Say by the rule of three, if 18 give 20 s. what will 22 s. 6 d. give? Multiply & divide, and you ſhall find 25 s. Then divide 25 s. by $10\frac{1}{2}$: and thereof cometh 2 s. 4 d. $\frac{4}{7}$. So much did the ell coſt.

$\frac{18}{1} \times \frac{20}{1}$, $22\frac{1}{2}$.

11. If I ſell one cloth for 5 l. whereupon I do loſe after 10 in the 100 I demand how much I ſhall loſe or gain, in the 100, if in caſe I had ſold the ſame for 5 pound 10 ſhil. Anſw. Say if 90 yield 100, how much will 5 pound give? Multiply and divide, and you ſhall finde 5 pound $\frac{5}{9}$.

Then

Then say again by the Rule of Three, if $5\frac{1}{3}$ come to $5\frac{1}{3}$, what will 100 come to? Multiply and divide, and you shall finde 99 l. which being substracted from a 100, there will remain 1 l. and so much is lost in the 100.

CHAP. V.

Of lendth and breadths of Tapestry, and other Clothes

1 IF a piece of Tapestry be $5\frac{3}{4}$ ells long, and $4\frac{2}{3}$ ells in breadth, how many ells square doth the same piece contain? Answer. Multiply the length by the breadth, that is to say $5\frac{3}{4}$ by $4\frac{2}{3}$, and thereof will come 26 ells $\frac{1}{6}$ so many ells square doth the same piece contain.

2. More, if a piece of Tapestry do contain 32 ells square, and the same being in length 6 ells $\frac{1}{4}$. I demand how many ells in breadth the same piece doth contain? Answ. Divide 32 ells by $6\frac{1}{4}$, and thereof cometh $5\frac{3}{25}$. So many ells doth the same piece contain in breadth.

3. More, a piece of cloth being $13\frac{1}{3}$ yards in length, and 5 quarters $\frac{1}{2}$ a quarter in breadth, how many yards of $\frac{2}{3}$ and $\frac{1}{2}$ of one third broad will the same piece make? Ans. See first by the 5 Reduction what part of a yard the $\frac{1}{4}$ and $\frac{1}{2}$ quarter be, and you shall

finde that they make $\frac{11}{4}$, which is one yard $\frac{3}{4}$. Then multiply 13 yards $\frac{1}{3}$ by 1 yard $\frac{3}{4}$ you shall have 18 yards $\frac{1}{3}$ in square, the which you must divide by $\frac{3}{4}$ and $\frac{1}{3}$ being reduced into one fraction by the 5 Reduction: that is to say, by $\frac{1}{2}$ (because the $\frac{3}{4}$ and $\frac{1}{3}$ being brought into one fraction maketh $\frac{1}{2}$) and you shall finde 22 yards. So many yards of $\frac{3}{4}$ and $\frac{1}{3}$ broad doth the same piece contain.

4. More, a Merchant bought 4 yards $\frac{3}{4}$ of cloth, being six quarters and half one quarter broad, to make him a gowne, the which he will line throughout with black Say of $\frac{3}{4}$ of a yard broad. I demand how much Say he must buy? Answ. Multiply the length of the cloth by the bredth, that is to say, $4\frac{3}{4}$ by $1\frac{1}{2}$ (which is the 6 quarters $\frac{1}{2}$ a quarter) and thereof cometh 7 yards $\frac{7}{10}$, the which divide by $\frac{3}{4}$, and you shall finde 10 yards $\frac{1}{3}$ so many yards of Say must he have to line the same 4 yards $\frac{3}{4}$ of cloth being of 6 quarters, and $\frac{1}{2}$ a quarter broad.

5. More, at 6 s. 8 d. the ell square what shall a piece of Tapestry cost me, which is 5 ells $\frac{1}{2}$ long, and 4 ells $\frac{1}{4}$ broad? Answer. Multiply $5\frac{1}{2}$ by $4\frac{1}{4}$, and thereof cometh 23 ells $\frac{3}{8}$ square: then say by the Rule of three, if 1 ell square cost me 6 s. 8 d. what shall $33\frac{3}{8}$ ells cost? Multiply and divide, and you shall finde 7 l. 15 s. 10 d. so much the

ſaid piece of Tapeſtry did coſt.

Or otherwiſe by the Rules of practice, take the $\frac{1}{7}$ of 23 $\frac{1}{7}$: and you ſhall finde 7 l. 15 s. 10 d. as above is ſaid.

6. More, a piece of Holland cloth containing 42 Ells $\frac{2}{7}$ Flemmiſh, how many ells Engliſh do they make? Here you muſt firſt note, that 100 ells Flemiſh, doe make but 60 ells Engliſh, and ſo conſequently, 5 ells Flemmiſh, do make but 3 ells Engliſh, Therefore ſay by the Rule of 3, if 5 ells Flemmiſh doe make 3 ells Engliſh, how many Engliſh will 42 ells $\frac{2}{7}$ Flemmmiſh make? Multiply and divide, and you ſhall finde 25 ells $\frac{1}{7}$ Engliſh, and ſo many ells Engliſh doth 42 ells $\frac{2}{7}$ Flemmiſh contain; the like is to be done of all others.

7. More, I have bought a piece of Tapeſtry, being 5 ells $\frac{1}{4}$ long, and 4 ells $\frac{2}{3}$ broad of Flanders meaſure, I demand how many ells ſquare it maketh Engliſh meaſure? Anſwer. Firſt foraſmuch as 3 ells Engliſh are worth 5 ells Flemmiſh, therefore put 3 ells Engliſh into his ſquare, in multiplying 3 by it ſelf which maketh 9: Likewiſe multiply 5 in it ſelf ſquarely, and it will be 25. Then Multiply 5 $\frac{3}{4}$, which is the length of the piece by 4 $\frac{2}{3}$, which is the breadth, and thereof cometh 26 ells $\frac{5}{6}$ ſquare, then ſay by the Rule of 3, if 25 ells

s square of Flemmish measure be worth 9 lls square of English measure, what are 16 ells $\frac{1}{8}$ Flemmish worth? Multiply and divide, and you shall find that they are worth 9 ells $\frac{33}{100}$ square of English measure.

8. More, at 3 s. 6 d. the ell Flemmish, what is the English ell worth after the rate? Answer. First, say if 5 ells Flemmish be worth 3 ells English, what is 1 ell Flemmish worth? Multiply and divide, and you shall finde $\frac{3}{5}$ of an English ell. Then say again by the Rule of Three, if $\frac{3}{5}$ of an English ell, be worth 3 s. 6 d. what is 1 English ell worth? Multiply and divide, and you shall finde 5 s. 10 d. so much shall the English ell be worth.

9. More, at 6 s. 8 d. the Flemmish ell square what is the English ell worth? Answer. Say by the aforesaid reason, if 25 Ells Flemmish square, be worth 9 ells square English, what is 1 ell square Flemmish worth? Multiply and divide, and you shall finde $\frac{9}{25}$ of a square English ell. Then say, if $\frac{9}{25}$ of an English ell be worth 6 s. 8 d. what is 1 square english ell worth? multiply and divide, and you shall finde 18 s. 6 d. $\frac{2}{9}$, so much shall 1 English ell square be worth.

CHAP.

CHAP. VI.

Of the reducing of the Pawnes of Genes into Englisſh yards

Note that 100 Pawns doe make 26 Yards, and 1 Pawn is $\frac{13}{50}$ of a Yard after the ſame rate, and 3 pawns $\frac{11}{15}$ do make 1 Yard.

Example.

1 I Have bought 97 Pawns $\frac{1}{2}$ of Genes velvet, and I would know how many Yards they will make? Anſw. Say by the Rule of Three, if 100 pawns do make 26 yards, what will 97 $\frac{1}{2}$ make? multiply and divide, and you ſhall have 25 yards $\frac{7}{25}$. So many yards do the 97 pawns $\frac{1}{2}$ contain.

Or otherwiſe, take ſome other number at your pleaſure, as 25 pawns which do make 6 yards $\frac{1}{2}$, and then ſay by the Rule of Three, if 25 pawns do make 6 yards $\frac{1}{2}$, what will 97 $\frac{1}{2}$ pawns make? Multiply and divide, and you ſhall finde 25 yards $\frac{7}{25}$, as before.

More, at 2 s. 7 d. the pawn of Genes, what will the Engliſh yard be worth after the rate? Anſw. Say by the Rule of Three, if $\frac{13}{50}$ of an Engliſh yard be worth 2 s. $\frac{7}{12}$ What is $\frac{1}{1}$ yard worth? Multiply and divide, and you ſhall finde 9 s. 11 d. $\frac{3}{13}$. So

much is the English yard worth Or otherwise multiply 100 pawns which is 26 yards, by 2 s. 7 d. and thereof cometh 258 s. 4 d. the which you must divide by 26 yards, and you shall finde 9 s. 11 d. $\frac{3}{13}$, as before.

3. If 257 pawns $\frac{1}{2}$ be worth 20 l. 16 s. 8 d. What is 1 Yard worth after the rate? Answer. Say by the Rule of Three, if 257 $\frac{1}{2}$ pawns be worth 20 $\frac{5}{6}$ what are 3 pawns $\frac{12}{514}$ worth? Multiply and divide, and you shall finde $\frac{1250}{40117}$ part of a pound, which is worth 6 s. 2 d. $\frac{3004}{7133}$, and so much is 1 yard worth.

CHAP. VII.

Of Merchandize sold by weight.

1. AT 9 d. $\frac{1}{2}$ the ounce, what is the pound weight worth? Answ. Say if $\frac{1}{1}$ give 9 $\frac{1}{2}$, what will $\frac{16}{1}$ give? Multiply and divide, and you shall finde 12 s. 8 d. so much is the yard worth.

Or otherwise, by the Rules of Practice, for 6 d. take the $\frac{1}{2}$ of 16 s. which is 8 s. then for 3 d. take the $\frac{1}{4}$ of 16 s. which is 4 s. Finally, for the halfe pence, take 16 ob. which are 8 d. then adde all these numbers together and you shall finde 12 s. 8 d. as before.

3. More, at 10 $\frac{1}{2}$, the ounce: what are

112 l. weight worth after the rate? Answ. Reduce 112 l. into ounces, in multiplying 112 l. by 16 ounces, and you shall have 1792 ounces: then say by the Rule of 3, if $\frac{1}{2}$ X 10 $\frac{1}{2}$. 1792 $\frac{1}{1}$ multiply and divide, and you shall finde 18816 d. which do make 78 l. 8s. and so much are the 112 l. worth after 10 d. $\frac{1}{2}$ the ounce.

4. At 12 s. 8 d. the pound weight, what is the ounce worth? Answer. Put 12 s. 8 d. into pence, and you shall have 152 d. then say by the Rule of Three, if 16 ounces cost 152 d. what shall 1 ounce cost? multiply and divide, and you shall finde 9 d. $\frac{1}{2}$ so much is the ounce worth.

Or otherwise, take the $\frac{1}{4}$ of 12 s. 8 d. for 4 ounces, and thereof cometh 3 s. 2 d. then for one ounce, take the $\frac{1}{4}$ of 3 s. 2 d. and you shall have 9 d. $\frac{1}{2}$, as before.

5. At 32 l. 10 s. the quintal, that is to say, the 100 l. weight: what is 1 l. weight worth after the same rate? Answer. Put 32 l. 10 s. all into s. and you shall have 650 s. Then say by the Rule of Three, if 100 give 650, what will 1 give? multiply and divide, and you shall finde 6 s. 6 d. so much is the l. worth.

6. If one pound of Saffron do cost me 18 s. 8 d. what shall 355 l. 10 ounces cost me.

me by the ſame price? Anſwer. Say by the Rule of Three, if $\frac{1}{7}$ X 18 $\frac{2}{7}$. 355 $\frac{5}{7}$. Multiply and divide, and you ſhall find 331 l. 18 s. 4 d. ſo much are the 355 l. 10 ounces worth.

Brief Rules of weight.

WHo that multiplyeth the pence that 1 pound weight is worth, by 5, and dirtecth the product thereof by 12, he ſhall find how many pounds in money the quintal is worth, that is to ſay, how much the 100 pound weight is worth.

And contrariwiſe, he that multiplyeth the pounds of money that the 100 l. weight is worth by 12, and divideth the product by 5, ſhall finde how many pence the pound weight is worth.

Example.

At 17 d. the pound weight, what is the 100 pound weight worth.

Anſwer. Multiply 17 by 5, and thereof cometh 85, divide the ſame by 12, and you ſhall finde 7 l. $\frac{1}{12}$ in money, which $\frac{1}{12}$ is worth 1 s. 8 d. So much is 100 l. weight worth.

More, at 13 l. the 100 l. weight, what is 1 l. weight worth?

Anſwer. Multiply 13 by 12, and thereof

cometh 156 : the which divide by 5, and you shall finde 31 pence $\frac{1}{5}$ which is 2s. 7 d $\frac{1}{5}$, and so much is one l. weight worth.

The like is to be done of yards, ells or of any other measure, when we reckon but 5 score to the C.

Brief Rules for Measure.

Who that multiplieth the pence that 1 ell is worth, by 2, and divideth the product by 4, he shall finde how many pounds in money the 120 ells are worth; which 120 ells we count but for a Hundred in this place, because of wrok, which measure is used for Canvas onely.

Or otherwise, if you divide the pence, that 1 ell is worth, by 2 : you shall have in your quotient the pounds that the said 120 ells are worth, and if any thing remain, they are parts of a pound.

And contrariwise, he that multiplyeth the pounds in money that the 120 ells are worth, by 4, and divideth the eff-come by 2, shall finde how many pence the ell is worth.

Or otherwise, if you multiply the pounds that 120 ells are worth, by 2, you shall find in the product how many pence one ell is worth.

Example.

Example.

At 10 d. the ell, what are 120 ells worth? Answer. Multiply 10 d. by 2, and thereof cometh 20. The which divide by 4, and you shall finde 5 l. so many pounds in money are 120 ells worth, at 10 d. the ell.

Or otherwise, divide 10 d. by 2 d. and thereof cometh into your quotient 5: which 5 doth represent 5 l. and so many pounds are the 120 ells worth, as before.

More, at 9 l. the 120 ells, what is 1 ell worth? Answer. Multiply 9 l. by 4, and thereof cometh 36, the which divide by 2, and you shall finde 18 d. so much is one ell worth.

Or otherwise, if you multiply 9 l. which is the price that the 120 ells are worth by 2, you shall have in the product 18, which 18 doth signifie the pence that 1 ell is worth, when the 120 ells doe cost 9 l. as before.

The like is to be done of all manner of Wares, which are sold after 120 to the Hundred.

Brief Rules of our Hundred weight her at LONDON, which is after 112 lib. for the C.

WHo that multiplieth the d. that 1 l. weight is worth by 7, and divideth the product by 15 shall finde how many pounds in money the 112 l. weight is worth.

And contrariwise, he that multiplieth the pounds in money, that 112 l. is worth by 15, and divideth the product by 7, shall finde how many pence 1 l. weight is worth.

Example.

At 9 d. the pound weight, what is the 112 pound weight worth? Answ. Multiply 9 d. by 7, and thereof cometh 63, the which divide by 15 and you shall finde 4 l. $\frac{3}{15}$, which being abbrevied is $\frac{1}{5}$ of a pound, being worth 4 s. And thus the 112 l. is worth 4 l. 4 s. after the rate of 9 d. the l.

At 8 l. the 112 l. weight, what is 1 l. weight worth? Answ. Multiply 8 l. by 15 and thereof cometh 120, the which divide by 7 and you shall finde 17 d. $\frac{1}{7}$, so much is 1 l. weight worth, when the 112 l. is worth 8 l.

CHAP.

CHAP. VIII.

Of Tares and allowances of Merchandize ſold by weight.

1 AT 12 l. the 100 ſuttel, what ſhall 987 l. ſuttel be worth? In giving 4 pound weight upon every 100 for tret? Anſwer. Adde 4 l. unto 100 and you ſhall have 104. Then ſay by the Rule of Three, if 104 be worth 12 pound what are 987 pound weight worth? Multiply and divide, and you ſhall finde 113 l. $\frac{23}{26}$, which is worth 17 s. 8 d. $\frac{4}{13}$. So much ſhall the 987 l. weight be worth.

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2. At 6 s. 8 d. the pound weight, what ſhall 345 l. $\frac{1}{2}$ be worth in giving 4 l. weight upon every 100 for the tret? Anſwer. See firſt by the Rule of Three, what the 100 l. is worth, ſaying, if $\frac{1}{1}$ X $6\frac{2}{3}$ $\frac{100}{1}$. Multiply and divide, and you ſhall find 33 l. $\frac{1}{3}$, then adde 4 l. unto 100 and they are 104, then ſay again by the Rule of Three, if 104 l. be ſold for 33 l. $\frac{1}{3}$, for how much ſhall 345 l. $\frac{1}{2}$ be ſold? Multiply and divide, and you ſhall finde 110 l. 14 s. 8 pence $\frac{11}{13}$, For ſo much ſhall the 345 $\frac{1}{2}$ be ſold, at 6 s. 8 d. the pound

pound, in giving foure upon the hundred.

3. More, if 100 l. be worth 36 s. 8 d. what shall 780 l. be worth, in rebating 4 l. upon every 100, for tare and cloffe? Answer; multiply 780 by 4, & thereof cometh 3120. The which divide by 100, and you shall have 31 l. $\frac{1}{5}$: abate 31 $\frac{1}{5}$ from 780, and there will remain 748 $\frac{4}{5}$. Then say by the Rule of 3, if $\frac{100}{1}$ do coft 36 $\frac{2}{3}$ what will 748 $\frac{4}{5}$ coft after the rate? Multiply and divide, so shall you find 274 s. 6 d. $\frac{18}{11}$, and so much shall the 780 l. coft, in rebating 4 l. upon every 100, for tare and cloffe.

4. More, whether he doth lose more that giveth 5 l. upon the 100. or he that rebateth 5 l. in the 100 for tare and cloffe? Answer. First note, that he which giveth 5 l. upon the 100, giveth 105 for 100: and he which rebateth 5 l. in the 100, giveth the 100 for 95: Therefore say by the Rule of Three, if 105 be given for 100, for how much shall the 100 be given? Multiply and divide, and you shall finde 95 $\frac{5}{21}$ and he which rebateth 5 in the 100 maketh but 95 of a 100: so that he loseth 5 in the 100, and the other which giveth 5 upon the 100, loseth but 4 $\frac{16}{21}$ upon the 100. Thus you may see that he which rebateth 5 in the 100 loseth more by $\frac{5}{21}$ in the 100, then the other which gave

5 upon the 100 for Tare and Cloſſe.

5. If 100 l. of Allom do coſt me 26 s. 8 d. how ſhall I ſell the pound weight, to gaine after the rate of 10 upon the 100? Anſw. Put 26 ſhillings 8 pence all into pense, and you ſhall have 320 pence. Then ſay by the Rule of Three, if 100 give 110, what ſhall 320 give? Multiply 320 by 110 and divide the product by 100, and you ſhall finde 352 pence. Then ſay again, if 100, pound be worth 352 pence, what is 1 pound worth? Multiply and divide, and you ſhall have 3 d. $\frac{26}{50}$? which $\frac{26}{50}$ is worth $\frac{1}{2}$, and $\frac{1}{25}$ of $\frac{1}{2}$. That is to ſay, the pound weight ſhall be worth 3 d. $\frac{1}{2}$ $\frac{1}{25}$ of a half peny, in gaining 10 upon the 100.

6. If 1 pound weight do coſt me 6 s. 10 d. and I ſell the ſame for 7 s. 2 d. I demand how much I ſhall gain upon the 100 l. of money after the rate? Anſwer. Say by the Rule of Three, if $6\frac{1}{6}$ yield $7\frac{1}{2}$: what will $\frac{100}{7}$ yield? Put the whole numbers into their broken, then multiply and divide, and you ſhall finde $104\frac{36}{41}$, from the which ſubſtract 100, and there reſteth 4 l. $\frac{36}{41}$, ſo much is gained upon the 100 pound of money after the rate.

7. More, If 1 pound do coſt me 5 s. 4 d. and I ſell the ſame again for 4 s. 9 d. I de-

mand

demand how much I ſhall loſe upon the 100 l. of money? Anſwer. Say, if $5\frac{1}{3}$, doe give but $4\frac{3}{4}$ what ſhall $100\frac{0}{3}$ give? Put the whole number into their broken, then multiply and divide, and you ſhall find $89\frac{1}{16}$, the which you muſt ſubſtract from a 100, and there will remain 10 l. $\frac{15}{16}$, ſo much is loſt upon the 100 l. of money.

8. More, if the pound weight doe coſt me 3 s. 2 d. and I ſell it again for 4 s. 4 d. how much ſhall I gain upon 20 s.? Anſwer. Say if $3\frac{1}{6}$ give $4\frac{1}{3}$, what ſhall $20\frac{0}{3}$ give? multiply and divide, and you ſhall find 27 s. $\frac{7}{19}$, from the which abate 20 s. and there will remain 7 s. $\frac{7}{19}$, which is 4 d. $\frac{8}{19}$, and ſo much is gained upon the pound of money, that is to ſay, upon 20 s.

9. If the pound weight doe coſt me 4 s. 4 d. and I ſell it again for 3 s. 2 d. I demand how much I ſhall loſe in the pound of money? that is to ſay, in 20 s. Anſwer. Say if $4\frac{1}{3}$ give but $3\frac{1}{6}$ what will $20\frac{0}{1}$ give? multiply and divide, and you ſhall finde 14 s. $\frac{5}{13}$ the which you muſt abate from 20 s. and there will remain 5 s. $\frac{5}{13}$, which $\frac{5}{13}$ is worth, 4 d. $\frac{8}{13}$ of a peny, and ſo much is loſt upon the pound of money.

CHAP. IX.

Of certain Questions, done by the double Rule, and also by the Rule of Three composed.

10 A Merchant hath sold Wines for the sum of 300 pounds, and he hath gained therein after 10 l. upon the 100 pound. The question is to know, how much he gained in all? Answ. Say by the Rule of Three, if 110 pound doe gain 10 pound, what will 300 l. gain? multiply and divide, and you shall find 27 l. $\frac{5}{11}$, and so much hath he gained in all.

11. A Merchant hath bought a piece of Hamshire Karsey containing 18 yards, for the price of 4 l. 10 s. The question is to know, how many yards he shall sell for 33 s. 4 d. to gain 20 s. in the whole piece? Answer. Adde 20 s. unto 4 l. 10 s. and they make 5 l. 10 s. Then say by the Rule of Three, if 5 l. $\frac{1}{3}$ doe yield me 18 yards, what will 1 l. $\frac{2}{3}$ yield? multiply and divide, and you shall find 5 yards, $\frac{5}{11}$. And so many yards shall he sell, to gain 20 s. in the whole piece.

12. A Merchant hath sold Sugars for the sum of 600 l. ready money, and he hath gained

gained in the whole, the sum of 60 l. The question is, to know how much he hath gained upon the 100 l. Answer. First you must subtract 60 l. from 600 l. and there will remain 540 l. Then say by the Rule of Three, if 540 l. doe gain 60 l. what will 100 l. gain? multiply and divide, and you shall find 11 l. $\frac{1}{9}$. And so much had he gained upon the 100 l.

13. More, if 1 l. weight of Laces do cost me 5 s. 10 d. and afterward I doe sell the same for 6 s. the l. to be paid for it at the end of 3 months: I demand how much I shall gain upon 100 l. in 12 months, after the rate? Answer. Say by the first part of the Rule of three composed: if 5 shillings $\frac{5}{6}$ in $\frac{1}{4}$ months do gain $\frac{1}{6}$ of a shilling, which is 2 d. what $\frac{100}{1}$ l. gain in $\frac{12}{1}$ months? multiply and divide, and you shall find 11 l. $\frac{3}{7}$. And so much shall I gain in 12 months after the rate.

14. More, if 1 piece of Karsey doe cost me 35 s. for what price may I sell the same to be paid for it at the end of 3 months, so that I may gain thereby after the rate of 10 l. upon the 100 l. in 12 months? Answ. Say by the first part of the Rule of Three composed, if 100 pounds in 12 months doe gain 10 l. what will 35 s. gain in Three

months? multiply and divide, and you shall find $\frac{1080}{1250}$ of a shilling, the which being abbreviated, both make $\frac{9}{10}$ of a shilling, which is worth 10 d. $\frac{4}{5}$, the same you must adde with 36 s. and then you shall have 36 s. 10 d. $\frac{4}{5}$. And for that price, I must sell the piece of Kersey for to gain therein 10 l. upon the 100 l. in 12 moneths, and giving 3 moneths time for the payment.

15. More, if 6 yards of northern Karsey doe cost me 8 s. and I sell 4 yards of the same Karsey for 6 s. I demand whether I gain or lose, and how much upon a 100 l. of money? Answ. First you must seek what the 4 yards of Karsey did cost: saying by the Rule of Three, if 6 yards doe cost 8 s. what will 4 yards cost? multiply and divide, and you shall find 5 s. $\frac{1}{3}$, and so much did the said 4 yards cost, therefore abate the same 5 $\frac{1}{3}$ from 6 s. and there will remain $\frac{2}{3}$ of a s. which $\frac{2}{3}$ is gained in the same 4 yards of Karsey. Then say again by the Rule of Three, if 5 $\frac{1}{3}$ doe gain $\frac{2}{3}$: what will 100 gain? multiply and divide, and you shall finde 12 and $\frac{8}{16}$, which $\frac{8}{16}$ being abbreviated is $\frac{1}{2}$. Therefore it appeareth that I shall gain 12 l. $\frac{1}{2}$ upon the 100 l. in selling 4 yards of the said Karsey for 6 s.

16. More, a Merchant hath bought a piece

piece of Damask which cost him 8 s. the yard ready money, and he selleth the same again to another Merchant, for 10 s. the yard, but he giveth two days for the payment, that is to say, 2 moneths for one half, and 5 moneths for the other half. The question is to know, how much the said first Merchant doth gain upon 100 l. in 12 months after the rate aforesaid? Answer. You must adde the 2 months and the 5 months both together, and they make 7 months, whereof you must take the one half, which is $3\frac{1}{2}$ months. And at that time, the second Merchant ought to have paid the whole, at one entire payment, and therefore say by the first part of the Rule of Three composed. If $\frac{8}{1}$ in $3\frac{1}{2}$ months, doe gain $\frac{2}{1}$ s. what will $\frac{100}{1}$ gain in $12\frac{1}{2}$ months? multiply and divide, and you shall finde 85 l. $\frac{1}{7}$. And so much doth the first Merchant gaine upon the 100 in 12 months.

17. A Merchant hath bought Velvet at 13 s. 9 d. the yard ready money, and he selleth the same for 14 s. 3 d. the yard, to be paid $\frac{1}{3}$ part in ready money, $\frac{1}{4}$ part at three months, and the rest which is $\frac{5}{12}$, is to be paid to him at 5 months. The question is, to know how much the first Merchant doth gain upon the 100 l. in 12 months, after

the same rate? Answer. See first at what time all the payments ought to be paid at once: and for to know the same, you must multiply every several payment, by the time it ought to be paid, and adde them together, then divide the product by the total summe of all the payments being added together; And your quotient will shew at what time all the payments ought to be paid at once, as in the former example, $\frac{1}{4}$ part in ready money is not multiplyed by any time, because it is paid presently, then $\frac{1}{4}$ part being multiplied by 3 moneths maketh $\frac{3}{4}$ of a moneth, and the rest being $\frac{5}{6}$ multiplyed by 5 months bringeth $2\frac{1}{12}$, then adde $\frac{3}{4}$ and $2\frac{1}{12}$ together and they make 2 months $\frac{7}{12}$, the which is the just time that all the payments ought to be paid at once. And therefore say by the first part of the Rule of Three composed. If $13\frac{1}{3}$ in 2 moneths $\frac{1}{6}$ do gain $\frac{1}{6}$ of a pound, what will 100 l. gain in 12 moneths after the rate? multiply and divide, and you shall finde 23 l. $\frac{2}{17}$. And so much doth he gain upon the 100 l. in 12 moneths.

18. A Merchant hath bought Fustians which cost him 22 s. 6 d. the piece ready money, and he will sell the same at 14 s. the piece, The question is to know what time he

he ought to give for the payment of the same, to the end he may gain after 9 l. upon the 100 l. in 12 moneths? Answer. Say if 22 $\frac{1}{2}$ do gain 1 $\frac{1}{2}$: what will $\frac{100}{1}$ gain? multiply and divide, and you shall finde 6 $\frac{2}{1}$ of gain. Then say again by the Rule of Three, if $\frac{2}{1}$ of gain doe require $\frac{12}{1}$ what will 6 $\frac{2}{1}$ of gain require? multiply and divide, and you shall finde 8 $\frac{8}{9}$, which is 8 moneths and $\frac{8}{9}$, and so long time ought he to give, to gain after the rate of 9 l. upon the 100 l. in 12 moneths.

19. A Merchant hath bought a piece of Satten being in length 20 yards which did cost him 12 pounds and 10 s. ready money. I demand for what price he shall sell the yard, to be paid at the end of 2 moneths, so that he may gain after the rate of 10 l. upon the 100 l. in 12 moneths? Answ. See first what the yard did cost him at the first; saying by the Rule of Three, if 20 yards, cost 12 l. 10 s. what will 1 yard cost? multiply and divide, and you shall finde 12 s. and 6 d. Then say again by the rule of three, if 12 moneths doe give me 10 l. what will 2 moneths give? multiply and divide, and you shall finde 1 l. $\frac{2}{3}$. Adde therefore the said 1 $\frac{2}{3}$ unto 100 & they are 101 $\frac{2}{3}$. Say therefore once again by the Rule of Three,

if $\frac{100}{1}$ doe give me 101 $\frac{2}{3}$ what will 12 give? multiply and divide, and you shall finde 12 s. and $\frac{17}{24}$ which is worth 8 d. $\frac{1}{10}$, and for 12 s. 8 d. $\frac{1}{3}$, must he sell the yard of Satten giving 2 months time for the payment to gain after the rate of 10 l. upon the 100 l. in 12 months.

20. More, if 1 l. weight of Cinamon doe cost me 8 s. ready money, for what price shall I sell 100 l. weight of the same, to be paid the $\frac{1}{4}$ at 1 month, and the residue at the end of 3 months; so that I may gain after 9 l. upon the 100 l. in twelve months after the rate? Answer. Seek first in how long time, both the payments should be made at once.

$\frac{1}{4}$. $\frac{1}{1}$. $\frac{1}{4}$.
$\frac{3}{4}$. $\frac{3}{1}$. 2 $\frac{3}{4}$.

2 $\frac{1}{2}$ moneth.

The which to doe, you must multiply each payment of money, by the time when it ought to be paid, that is to say, you must multiply the first payment which is $\frac{1}{4}$ part by $\frac{1}{1}$ month, & thereof cometh $\frac{1}{4}$ of a month. Likewise you must multiply the next payment which is $\frac{3}{4}$ by 3 months, and thereof will come 2 meneths $\frac{1}{4}$ Then adde $\frac{1}{4}$ of a month, and two months $\frac{1}{4}$ both together, and they make two months $\frac{1}{2}$ which is the time that both the payments ought to be

paid

paid at once. Then say by the Rule of Three, if 12 months do give 9 l. what will 2 months $\frac{1}{6}$ give? multiply and divide, and you shall find $1\frac{7}{12}$. Say again by the Rule of Three. If 1 l. weight do cost me 8 s. what will 100 l. cost? multiply and divide, and you shall find 40 l. Then say once again, if $\frac{120}{12}$ do give $101\frac{7}{12}$, what will $\frac{40}{1}$ give? multiply and divide, and you shall finde $40\frac{3}{4}$. And for 40 l. 15 s. I must sell 100 l. weight of Cinamon, to be paid at the 2 several times aforesaid, to gain therein after the rate of 9 l. upon the 100 l. in 12 months, as by example aforesaid.

20. When the quarter of Wheat doth cost 6 s. 8 d. the loaf of Bread weighing 20 ounces, is sold for a half peny. I demand that if the quarter of Wheat did cost ten shillings, for how much shall the loaf of Bread be sold, that weigheth 16 ounces? you shall answer by the first part of the Rule of Three composed, which is mentioned in the second Chapter of the third part of this Book, where you must say by the same first part of the Rule of Three composed, if $6\frac{2}{3}|\frac{20}{1}|\frac{1}{2}|\frac{10}{1}|\frac{16}{1}$.

Then multiply the first number by the second and the product thereof shall be your Divisors. Likewise multiply the other three

thrée numbers the one by the other, and the product thereof shall be your dividend: as thus, first multiply $6\frac{2}{3}$ by $2\frac{2}{3}$, and thereof cometh $40\frac{0}{3}$ for your divisor, then multiply $\frac{1}{2}$ by 10 and the product thereof by $16\frac{2}{3}$, so you shall have $160\frac{2}{2}$ for your number that is to be divided, then divide $160\frac{2}{2}$ by $40\frac{0}{3}$, and thereof cometh $\frac{4800}{80}$, the which being abbrevied bringeth $\frac{3}{4}$ of a peny: and for that price must the loaf of bread be sold, which weigheth 16 ounces, when the quarter of wheat is worth 10 shillings.

Or otherwise by the Rule of Thrée at two times. First say, if 24 ounces give $\frac{3}{4}$, what will 16 ounces give? multiply and divide, and you shall finde $\frac{3}{4}$ of a peny. Then say again, if $6\frac{2}{3}$, doe give me $\frac{3}{4}$, what will 10 give? multiply and divide, and you shall finde $\frac{3}{4}$ of a peny, as before is said.

21. When the carriage of one hundred weight of Merchandize 50 miles doth cost 5 s. what shall the carriage of 500 weight cost me for 16 miles? Answer. By the first part of the rule of 3 composed, saying, if 100 50 5|500|16. multiply 100 by 50, the product will be 5000, which shall be your divisor. Then multiply 5 times 500 by 16, and thereof cometh 40000 for your dividend. Then more divide 40000 by 5000, and you shall

shall finde 8 s. so much shall cost the carriage of 500 weight 16 miles.

Or otherwise by the double Rule of 3, that is to say, by the Rule of Three at two times: first say, if 50 miles doe pay 5 s. what shall 16 miles pay? multiply and divide, and you shall finde 1 s. $\frac{3}{5}$ Then say again, if 100 weight doe cost me 1 s. $\frac{3}{5}$, what shall 500 weight cost? multiply and divide, and you shall finde 8 s. as before.

52. When the carriage of 100 pound weight of Merchandize 84 miles doth cost me 6 s. how many miles may I have 64 pound weight carried for 3 s. 4 d.? Answ. by the second part of the Rule of Three compos'ed, and say if $\frac{100}{1}|\frac{84}{1}|\frac{6}{1}|\frac{64}{1}|3\frac{1}{3}$. Then multiply the fourth number $\frac{64}{1}$, by the third number $\frac{6}{1}$ and thereof cometh $\frac{384}{1}$ for your divisor. Likewise multiply $3\frac{1}{3}$ by $\frac{100}{1}$, and by $\frac{84}{1}$, and you shall have in the product $\frac{84000}{3}$ then divide $\frac{84000}{3}$ by $\frac{384}{1}$ and you shall finde 72 miles, and $\frac{11}{12}$ of a mile. So many miles shall the 64 pound weight be carried for 3 s. 4 d.

Otherwise by the Rule of Three, at two times: First, say, if 100 weight doe cost me 6 d. what will 94 pound weight cost? multiply & divide, and you shall finde 3 s. $\frac{11}{25}$. Then say, if $3\frac{11}{25}$ be paid for 94 miles carriage:

carriage: for how many miles shall 3 s. $\frac{1}{3}$ be paid? multiply and divide, and you shall finde 72 miles $\frac{11}{12}$, as before.

23. If 100 Horses, in 100 Daies, doe spend 190 Quarters of Oats: how many Quarters of Oats 350 Horses spend in 150 Daies? Answer. By the first part of the Rule of Three composed you must multiply 180 times 350, by 150: and divide the product by 100 times 100: and you shall finde 945 Quarters. So many Quarters of Oats will 350 Horses spend, in 150 Daies. Or otherwise by the Rule of Three, at two times. First say, if 100 Daies doe yield me 180 quarters of Oats: what shall 150 dayes yield? multiply and divide, and you shall find 270 quarters: then say again, if 100 Horses doe spend 270 quarters of Oats, how many quarters of Oats will 350 Horses spend? multiply and divide, and you shall finde 945 quarters, as before.

CHAP

CHAP. 10.

Of the Rules of Fellowship, without any time limited.

THe Rule of Fellowship is thus: you must set down each mans sum of money, that he layeth into company, every one directly under the other, the which sums you shall adde all together, and the total sum of all their whole stocks being thus assembled shall be your common divisor, to the finding out of every mans part of the gain. Then you shall multiply either the gain, or else the losse, which soever of them do happen, by each mans portion of money that he laid in, and divide the products by the said divisor: so shall you have in your quotient every mans part of the gain, if any thing be gained, or else of the losse if any thing be lost.

Example.

1. TWo Merchants have laid their money in company together: the first laid in 500 l. The second laid in 300 l. and with trading they have gained 64 l. I demand, how much each man shall have of the same gaines according to the money that he laid in? Answer. Adde 500 and 300 both together,

ther, which are the parcels or summs that they both laid in, and thereof cometh 800 for your divisor: then say by the Rule of Three, if 800 l. which is the whole stock, doe gain 64 l. what shall 500 l. gain? (which is the first mans money that he laid in:) multiply and divide, and you shall finde 40 l. for the first mans part of the gain: then say, if 800 give 64 what will 300 give? multiply and divide, and you shall finde 24 l. for the second mans part of the gain.

500
300 | 800 | 64 | 500.
800

800 | 64 | 300.

Or otherwise, put 500 pound which is the first mans money that he laid in, over the 800 l. which is the whole stock, and you shall have $\frac{500}{800}$, which being abbrevied, doe make $\frac{5}{8}$ and such part of the gain shall the first man take, that is to say $\frac{5}{8}$ of 64 pound which is 40 l. And consequently, by the same manner, the second shall take the $\frac{3}{8}$ of 64, which is 24 pound, for his part of his gain, as before.

5

5|00	3|00
8|00	8|00

2. Two Merchants have companied together, the first laid in 640 l. and he taketh $\frac{5}{8}$ parts of the gain, I demand how much the second Merchant laid in? Answer. Seeing that the first Merchant taketh $\frac{5}{8}$ of the gain, it follows that the second Merchant must have $\frac{3}{8}$, which is the rest, and therefore say by the Rule of Three, if $\frac{5}{8}$ of the gain which the first man taketh, did lay into the stock $\frac{640}{1}$. How much shall $\frac{3}{8}$ of the gain lay in, which is the second mans gain? multiply and divide, and you shall finde 384 l. so much ought the second man to lay into company.

3. Two Merchants have companied together, the first man laid in 640 l. and the second hath laid in so much money for his part that he must have 60 l. for his part of 100 l. that they have gained. I demand how much the second man did lay into company? Answer. Seeing that the second man taketh 60 l. of the gain, it followeth that the first must have the rest of the 100 l. which is but 40 pound. Therefore say by the Rule of Three, if 40 l. doe lay in 640 l. what shall 60 l. lay in? multiply and divide,

vide and you shall finde 960 l. so much did the second Merchant lay in.

4. Two Merchants have companied together. The first laid in 83 l. 6 s. 8 d. The second laid in 170 Duckets, and they have gained 100 l. of the which the first man must have 60 l. I demand what the Ducket was worth. Answer. Seeing that the first man must have 60 l. it followeth that the second must have 40 l. Therefore say by the Rule of Three, if 60 l. of gain that the first man taketh, did lay in 83 l. 6 s. 8 d. principal, how much shall 40 l. gain put in, which is the gain that the second man taketh? multiply and divide, and you shall find 55 l. $\frac{5}{9}$, so much are the 170 Duckets worth. Then put 55 l. $\frac{5}{9}$ into shillings, and you shall have 1111 s. $\frac{1}{9}$. So then for to know what the Ducket is worth. Say by the Rule of Three, if the $\frac{170}{1}$, give 1111 $\frac{1}{9}$, what will $\frac{1}{1}$ give? multiply and divide, and you shall finde 6 s. 6 d. $\frac{11}{17}$, so much is the Ducket worth.

5. Two Merchants having companied together, the second man laid in more by 30 l. then did the first man, and they gained 120 l. of the which the first man ought to have 50 l. I demand what each of them did lay in? Answer. From 120 l. abate

50 l.

50 l. and there resteth 70 l. for the second mans part: so that by this means the second man (because he laid in 30 li. more than the first man did) he taketh 20 l. more of the gaine: and therefore say by the Rule of Three, if 20 l. gaine did lay in 30 l. principall, how much shall 50 l. gaine lay in? multiply and divide, and you shall find 75 l. so much did the first man lay in, and consequently the second laid in 105 l.

6. Two Merchants have companied together, the 2 d. hath laid in twice so much as the first man did, and 10 l. more: & they have gained 100 l of the which, the first ought to have 32 l. for his part: I demand how much each of them did lay into company? Answ. If it were not for the 10 li. that the second man laid in more than the first, he should have had but 64 l. of the gaine, which is the double of the first mans part. But because he laid in 10 l. more, he hath therefore 4 l. more of the gaine, and therefore say by the Rule of Three, if 4 l. gaine did lay in 10 l. of principall (which was over and above the double of the first mans layings in) what shall 32 li. of gaines lay in, which is the first mans part of the gaines that he taketh? multiply and divide, and you shall find 80 li. for the first

mans laying in: and so consequently 170l. for the second mans portion that he laid in.

7. Two merchants have companied together, and they have gained 100 pound, of the which the first must have after the rate of 10 l. upon the 100 l. and the second must have after the rate of 15 li. upon the 100 l. I demand how much each of them ought to have? Answ. Put 10 l. for the first mans laying in, and 15 l. for the second mans laying in. Adde therefore 10 l. and 15 l. together, and they make 25 l. Then put 10 over 25, and it is $\frac{10}{25}$ which being abbrevied are $\frac{2}{5}$. Therefore he that taketh 10l. upon the 100 l. must have the $\frac{2}{5}$ of the gain, which is 40 l. Then put 15 over 25, and it is $\frac{15}{25}$ which being abbrevied are $\frac{3}{5}$: Therefore the second must have $\frac{3}{5}$ of the 100 l. which is 60 l.

8. Two merchants have companied together, The first laid in 46 l. 18 s. and the second laid in 33 l. 2 s. so they have gained 30 l. I demand how much every man shall have for his part of the gaine? Answ. Adde 46 pound 18 shil. and 33 l. 2 s. both together, and you shall finde 80 l. for your common divisor: then say if 80 l. which is all their stock doe gaine 30 l. what will 46 $\frac{9}{10}$ gaine? which is the money that the first

firſt man laid in? multiply and divide, and you ſhall finde 171. 11 s. 9 d. for the firſt mans part of the gaine. Then ſay againe by the Rule of Three, if 80 l. doe gaine 30 l. what will 33 l. $\frac{1}{10}$ gaine which was the ſecond mans money that he laid in? multiply and divide, and you ſhall finde 12 li 8 s. 3 d. for the ſecond mans part of the gaine.

And after the ſame manner ſhall you do, in caſe that they were 3 or 4 Merchants that would company together. Adding all and every of their ſums of money (which they lay into the ſtock) into one total ſum, which ſhall be your common diviſor: and then work with the reſt, as is taught in the former queſtion of the Rule of Company.

Example.

9. Three Merchants have companied together, the firſt laid in I know not how much: the ſecond did put in 20 pieces of cloth: and the third hath laid in 500 li. So at the end of their company, their gaines amounteth unto 1000 l. whereof the firſt man ought to have 350 l. and the ſecond muſt have 400 l.

Now I demand, how much the firſt man did lay in, and for how much the 20 pieces of cloth were put into company.

Answ. Seeing that the first, and the second Merchants must have 750 pound for their part of the gaine; Then the third man must have the rest of the 1000 pound, which is 250 pound. And therefore say by the Rule of Three, if 250 pound gaine, become of 500 pound principal, of how much shall come 350 pound gaine, which the first man taketh? multiply and divide, and you shall finde 700 pound. So much did the first man lay in: then say if 250 pound gaine, become of 500 pound principal, of how much will come 400 pound, which is the gaine that the second man taketh? multiply and divide, and you shall finde 800 pound. For that price were the twenty pieces of Cloth laid into company.

10. Three Merchants have gained 100 pound: The first must have the $\frac{1}{2}$. The second must have the $\frac{1}{3}$. And the third must have the $\frac{1}{4}$. I demand how much every man must have of the gaine? Answer. Reduce $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$, into a common denomination, after the order of the second Reduction in Fractions, and you shall finde $\frac{12}{24}$, for the $\frac{1}{2}$ $\frac{8}{24}$ for the $\frac{1}{3}$, and $\frac{6}{24}$ for the $\frac{1}{4}$: Then take 12 for the first mans laying in, 8 for the second mans laying in, and 6 for the third mans laying in. The which three

three numbers being added together, shall be your common diuisor, and they do make 26. Then multiply 100 l. by 12, for the first man: then againe 100 l. by 8 for the second: and last of all 100 l. by 6 for the third man. And diuide the products of euery multiplication by 26. So shall you finde 46 l. $\frac{2}{13}$ for the first mans part of the gaine: 30 l. $\frac{10}{13}$ for the second mans part: and 23 l. $\frac{1}{13}$ for the third mans part.

11. Two Merchants haue gained 100 pound. The first must haue $\frac{1}{2}$ and 5 pound more, the second must haue $\frac{1}{3}$ and 4 l. more: I demand how much each of them shall haue? Answ. First, from 100 abate 5 and 4, which are 9, so there will remaine 91, then take the $\frac{1}{2}$ of 100 l. which is 50 l. for the first mans laying in. Likewise, take $\frac{1}{3}$ of 100 l. for the second mans laying in, which is 33 l. $\frac{1}{3}$: Then adde 50 l. and 33 l. $\frac{1}{3}$ together, and you shall haue 83 l. $\frac{1}{3}$ for your common diuisor: then multiply 91 l by 50, and diuide by 83 $\frac{1}{3}$ & thereof cometh 54 l. $\frac{3}{7}$, unto the which number adde 5, and all is 58 l. $\frac{3}{7}$ for the first mans part of the gaine. Likewise multiply 91 by 33 $\frac{1}{3}$, and diuide by 83 $\frac{1}{3}$ and you shall finde 36 l. $\frac{3}{5}$ unto the which adde 4, and you shall haue 40 l. $\frac{3}{5}$ for the second mans part.

12 Two Merchants have gained 100 l. The first must have the $\frac{1}{2}$ lesse by 4 l. The second must have $\frac{1}{3}$ lesse by 2 l. I demand how much each of them shall have? Answ. Adde 4 and 2 with 100, and they make 106. Then take as before is said, 50 l. for the first man: and $33\frac{1}{3}$ for the second, and adde them both together, and they be $83\frac{1}{3}$ which shall be your division. Then multiply 106 by 50, and divide the product by 83 l. $\frac{1}{3}$, so thereof cometh 63 l. $\frac{3}{5}$. From the which abate the 4 l. lesse that the first man taketh, and then is there remaining 52 l. $\frac{1}{5}$ for his part. Likewise multiply 106 by $33\frac{1}{3}$, and divide by $83\frac{1}{3}$ and you shall finde 42 l. $\frac{1}{5}$ from the which abate 2 l. lesse and, there remaineth 40 l. $\frac{1}{5}$ for the second mans part.

The Rule of Fellowship, with time.

The money that every man layeth in, must be multiplyed by the time that it continued in company: and of that which cometh thereof, you shall make their new layings in for each of them: and then multiply the gaines by every one of them severally, and the off-comes you shall divide by all their new layings in added together, and then you shall have proportionally, each

mans

mans part of the gaine according to his laying in.

Example.

1. Two Merchants have companied together, The first hath put in the 1 of January, 450 l. The second did lay the 1 of May, 750 l. And at the yeares end, they had gained 100 l. I demand how much each of them shall have of the gaine? Answer. For as much as the first did put 450 l. the 1 of January, his money continued in company 12 months, and therefore multiply 450 by 12 months, & thereof cometh 5400 for his new laying in. And the second laid in his 750 l. but at the 1 day of May: so that his money remained in company but 8 months. Therefore multiply his 750 l. by 8 and thereof cometh 6000 for his new laying in. Then adde 5400 with 6000, and they make 11400 for your common divisor. Then multiply 100 l. which is the gaines, by 5400, and divide the product by 11400, and thereof will come 47 l. $\frac{7}{19}$ for the first mans part of the gaine. Likewise multiply 100 by 6000, & divide the product by 11400, and you shall finde 52 $\frac{12}{19}$: and so much must the second man have for his part of the gaine.

2. Two merchants have companied together, the first hath laid in the 1 of January, 640l. The second can lay in nothing until the first of April. I demand how much he shall then lay in, to the end that he may take halfe the gaine? Answ. multiply 640l. by 12 months, that his money abideth in company, and thereof will come 7680l. for his laying in. And so much ought the second man to lay in, for because he taketh $\frac{1}{2}$ of the gain. But for that, that he putteth in nothing untill the 1 of April, his money can be in company no longer then nine monthes. And therefore divide 7680 by 9, and thereof will come 853l. $\frac{1}{3}$. So much ought the second Merchant to lay in the 1 of April, to the end that he may take the one half of the gains.

3. Three Merchants have companied together, The first laid in the 1 of March 100l. the second laid in the 1 of June so much money, that of the gaine he must have the $\frac{1}{3}$ part. and the third laid in the 1 of November so much money, that of the gaines he must have likewise $\frac{1}{3}$, and they continued in company untill the next March following. I demand how much the second and the third Merchants did lay in? Answ. Multiply 100l. which the first man did

did lay in, by twelve mouths, that his money continued in company, and thereof cometh 1200 for his laying in, and so much ought the second and the third Merchants each of them to lay in, because they part the gaines by thirds. But for that, that the second Merchant layeth in nothing till the 1 of June, his money can be in company but 9 months. Therefore divide 1200 by 9 months, and thereof will come 133 $\frac{1}{3}$. And so much ought the second Merchant to lay in. Then forasmuch as the third Merchant did lay in nothing untill the 1 of November, his money abideth in company but the space of 4 months. Therefore divide 1200 by 4, and thereof cometh 300 l. And so much ought the third Merchant to lay into company.

4. Three Merchants have companied together, the first laid in the 1 of January, 100 Duckets. The second hath laid in 50 pound the 1 of March, and the third put in a Jewell, the 1 of July, and at the yeares end, they had gained 400 crownes: of the which the first merchant must have 50 Crowns, and the second must have 80. I demand what the Ducket was worth, and at what price the Jewel was valued, which the third merchant laid in? Answ.

The

The first mans money being 100 Duckets multiplied by 12 is 1200 Duckets by the rule aforesaid, and he taketh 50 Crownes for the gaine: therefore say if 50 Crownes gain become of 1200, which was his stock, of how much shall come 80 Crowns gain, that the second man taketh? multiply and divide, and you shall finde 1920, for the second Merchants laying in. Then say again, if 50 Crownes become of 1200 stock, of how much shall come 2700 Crownes, which the third man taketh of the gaine? multiply and divide, and you shall finde 6480 for the third Merchants laying in. Then divide 1920, which is the second mans laying in, by 10 months, that his money did continue in company, and you shall finde 192 Duckets, which are worth 50 l. because he laid in 50 l. Then divide 50 l. (being first reduced into shillings by the said 192 Duckets) and thereof will come 5 shillings 2 pence $\frac{1}{7}$. So much was the Ducket worth: Finally, divide 6408, (which is the third mans laying in) by 6 months that his Jewel remained in company, and you shall finde 1080 Duckets, and for that price was the Jewel put into company.

5. Three Merchants have companied together;

together: The firſt laid in the 1 of January 100 li. and the 1 of April he hath taken back againe 20 li. The ſecond hath laid in the 1 of March 60 li. and afterward he did lay in more 100 li. the 1 of Auguſt. The third laid in the the 1 of July 150 li. And the 1 of. October he did take back againe 50 pounds. And at the yeares end, they found that they had gained 160 pounds. I demand how much every man ſhall have of the gaine? Anſwer. Multiply 100 pounds which the firſt man laid in by twelve months, and thereof cometh 1200 pounds, from that number abate 9 times 20 li. which are 180 for that which he did take back againe: and there will remaine 1020, for the firſt mans laying in: Then multiply 60 which the ſecond man laid in by 10, and you ſhall have 600: unto the which adde 5 times 100 li. for the money he laid in more the 1 of Auguſt, which are 500, ſo all amounteth to 1100 for the ſecond mans laying in. Afterwards multiply 150 pound, which the third man hath laid in, by 6 months, and thereof cometh 900 from the which number abate 3 times 50, and they are 150 for the money that he did take back againe, the firſt of October, ſo there will remaine 750, for the third

mans

mans laying in. Then proceed with the rest, as is taught in the first Question of the Rule of Fellowship with time in adding 1020, 1100 and 750 altogether, which shall be your divisor. Then multiply 160 l. which is the gaine by 1020, by 1100, and by 750: and divide at every time by your divisor, that is to say, by all their layings in, added together, which is 2870: so you shall finde 56 $\frac{248}{287}$ for the first man: 61 $\frac{93}{287}$ for the second: and 41 $\frac{233}{287}$ for the third man.

6. Two Merchants have companied together. The first hath laid in 960 pounds for the space of 12 months, and he ought to have 8 pound upon the 100 pound of the gaine. The second hath laid in 1120 pound for the space of 8 months, and he ought to have after 12 pound upon the 100 pound of the gaine.

And at the yeares end, they have gained 800 l. I demand how much each of them shall have of the gaine? Ans. multiply 960 that the first man did lay in by 12 months, and the product thereof multiply againe by 8, and you shall have 92160, for the first mans laying in: then multiply the 1120 that the second hath laid in by 8 months, and that which cometh thereof, you shall

multi-

multiply againe by 12, and you ſhall finde 607520, for the ſecond mans laying in. Then proceed with the reſt, as in the firſt queſtion of the Rule of Fellowſhip is declared, as in the laſt example I have taught you, and you ſhall find 369 pound $\frac{3}{17}$ for the firſt man: and 430 pound $\frac{10}{17}$ for the ſecond man.

The Rule of Company, betweene Merchants and their Factors.

NOte that the eſtimation of the body, or perſon of a Factor, is in ſuch proportion to the ſtock which the Merchant layeth in as the gaine of the ſaid Factor is unto the gaine of the Merchant. As thus, if a Merchant doe deliver into the hands of his Factor 200 pound to employ, and he to have halfe the profit, the perſon of the ſaid Factor ſhall be eſteemed to be worth 200 pound And if the Factor doe take but the $\frac{1}{3}$ of the gaine, he ſhould have but $\frac{1}{2}$ ſo much of the gaine as the Merchant taketh which muſt have $\frac{2}{3}$: wherefore the perſon of the Factor is eſteemed but the $\frac{1}{2}$ of that which the Merchant layeth in, that is to ſay, 100 pound.

And if the Factor did take the $\frac{2}{3}$ of the gain,

gaine, then the Merchant shall take the residue, which are $\frac{3}{5}$ of the gaine: wherefore the gaine of the Merchant unto that of the Factor, is in such proportion as 3 unto 2. Then if you will know the estimation of the person of the Factor, say if 3 give me 2, what will 200 give? multiply 200 by 2, and divide by 3, so you shall finde $133\frac{1}{3}$. Or otherwise you must consider that the Factor taketh the $\frac{2}{3}$ of that which the Merchant taketh. And therefore take the $\frac{2}{3}$ of 200, and you shall finde $133\frac{1}{3}$ as before: and so much is the person of the Factor esteemed to be worth.

8. And if the Merchant should deliver unto his Factor 200 l. and the Factor would lay in 40 l. and his person, to the end he might have the halfe of the gaine; I demand for how much shall his person be esteemed?

Answer. Abate 30 l. from 200 l. and there will remaine 160 l. and at so much shall his person be esteemed.

And if the Factor would take the $\frac{3}{5}$ of the gaine, his person with his 40 pound shall be esteemed twice as much as the stock that the Merchant layeth in, which should have put $\frac{1}{5}$ of the gain, for $\frac{2}{5}$ unto $\frac{3}{5}$ is in double proportion, Therefore double

200

200 pounds, and thereof cometh 400 l. from the which abate 40 l. and there will remaine 360 l. But if the Factor would take onely the $\frac{1}{3}$ of the gaine, that ſhall be but the $\frac{1}{3}$ of $\frac{2}{3}$ which the Merchant taketh; and then the eſtimation of his perſon with his laying in ſhould be eſtæmed but the half of that which the Merchant layeth in: you muſt therefore take the $\frac{1}{2}$ of 200 l. which is 100 l. from the which you ſhall abate 40 l. and the reſt which is 60 l. is the eſtimation of his perſon.

9. If it ſo chance for to make traffick of 240 l. that the perſon of the Factor ſhould be in ſuch wiſe eſtæmed that he ſhould have but the $\frac{1}{4}$ of the gain, and yet he would have the $\frac{2}{3}$, I demand how much ready money he ought to lay in, beſides his perſon? Anſw. Seeing that his perſon gaineth the $\frac{1}{4}$, therefore all the whole laying in, which is 240 l. ſhall gaine the reſt, that is to ſay, the $\frac{3}{4}$. Now becauſe $\frac{1}{4}$, is the $\frac{1}{3}$ of $\frac{3}{4}$, therefore his perſon ſhall be eſtæmed the $\frac{1}{3}$ of all the laying in. Take then the $\frac{1}{3}$ of 240 l. and you ſhall have 80 l. for the eſtimation of his perſon, and for becauſe that he will have half of the gaine, you ſhall adde 80 l. with 240 l. and thereof commeth 320 l. of the which take the half, which is 160 l.

and

and from the same you shall abate the 80 l. and there will remaine other 80 l. which he ought to lay in of ready money, and the Merchant must lay in the over-plus, which amounteth to 160 l.

10. A Merchant hath delivered to the Factor 1200 l, to govern them in the trade of merchandize upon such condition, that he for his service shall have the $\frac{1}{3}$ of the gaine, if any thing be gained, and he shall beare the $\frac{1}{3}$ of the losse, if any thing be lost: I demand, for how much his person was esteemed? Answ. Seeing that the Factor taketh the $\frac{1}{3}$ of the gain, his person ought to be esteemed as much as $\frac{1}{2}$ of the stock which the Merchant layeth in, that is to say, the $\frac{1}{2}$ of 1200 which is 600 l. The reason is, for because the $\frac{1}{3}$ of the gaine that the Factor taketh, is the $\frac{1}{2}$ of the $\frac{2}{3}$ of the gaine that the Merchant taketh. And so the Factor his person is esteemed to be worth 600 l.

11. A Merchant hath delivered unto his Factor 1200 li. and the Factor layeth in 500 li and his person. Now because he layeth in 500 l. and his person, it is agreed between them, that he shall take $\frac{2}{5}$ of the gaine: I demand, for how much his person was esteemed? Answ. For asmuch as the

Factor

Factor taketh the $\frac{2}{3}$ of the gaine, he taketh the $\frac{2}{3}$ of that which the Merchant taketh, for $\frac{2}{5}$ are the $\frac{2}{3}$ of $\frac{3}{5}$: and therefore the Factors laying in, ought to be 800 l. which is the $\frac{2}{3}$ of 12000 l. that the Merchant laid in. Then abate 500 l. which the Factor did lay in from 800 l. which should be his whole stock: and there remaineth 300 l. for the estimation of his person.

12. More, a Merchant hath delivered unto his Factor 1000 l. upon such condition, that the Factor for his paines and service, shall have the gaines of 200 li. as though he laid in so much ready money: I demand what portion of the gain the said Factor shall take? Answ. See what part the 200 l. (which the Factor laid in) is of 1200, which is the whole stock of their company. and you shall find that is the $\frac{1}{6}$? and such part of the gaine shall the Factor take.

But in case, that in making their covenants, it were agreed betweene them, that the Factor should have the gaine of 200 l. of the whole stock which the Merchant layeth in, that is to say, of the 1000 l. then should the Factor take the $\frac{1}{5}$ of the gaine: for 200 l. is the $\frac{1}{5}$ of a 1000 l.

Caap. II

Of the Rules of Barter: that is to say, to change Ware for Ware, &c.

1 TWo Merchants will change their merchandize, the one with the other. The one of them hath Cloth of 7 s. 1 d. the yard to sell for ready money, but in barter he will sell it for 8 s. 4 d. The other hath Cinamon of 4 s. 7 d. the pound, to sell for ready money: I demand how he shall sell it in barter that he be no loser? Answ. Say if $7\frac{1}{12}$ (which is the price that the yard of Cloth is worth in ready money) be sold in barter for $8\frac{1}{3}$, for what shall $4\frac{7}{12}$ be sold in barter, which $4\frac{7}{12}$ is the price that the pound of Cinamon is worth in ready money? reduce the whole numbers into their broken, and then multiply & divide and you shall finde 5 s. 4 d. $\frac{11}{17}$ parts of a peny, and for so much shall he sell the pound of Cinamon in barter.

2. TWo Merchants will barter their merchandize the one with the other: The one of them hath Chamblets, of 2 l. 18 s. 4 d. the piece, to sell for ready money, & in barter he will sell the piece for 4 l. 3 s. 4 d. The other hath fine Caps of 35 s. 10 d. the dozen

to

to sell in barter. I demand what the dozen of Caps were worth in ready money? Ans. Say, if 4l. 3s. 4d. which is the over-price of the piece of chamblet, become of 2l. 18s. 4d. which was the just price of the same, of what shall come 35s. 10d. which is the over-price of the dozen of Caps? multiply and divide, & you shall find 25s. 1d. and so much are the dozen of Caps worth in ready money.

3. Two Merchants will change their merchandize the one with the other: the one of them hath Fustians of 18s. 4d. the piece to sell for ready money, and in barter he will sell the piece for 26s. 8d. The other hath Tapestry of 15d. the ell to sell for ready money, and in barter he will sell it for 20d. the ell; I demand which of them gaineth, and how much upon the 100l. of money? Answ. Say if 18s, $\frac{1}{3}$ (which is the just price of the piece of Fustion) be sold in barter for 26s. $\frac{2}{3}$ for how much shall 1 ell, $\frac{1}{4}$ (which is the just price of the ell of Tapestry) be sold in barter? multiply and divide, and you shall find 21d. $\frac{2}{11}$: And he doth over-sel it but for 20d. So that of 21 $\frac{2}{11}$ he maketh but 20d. And therefore say by the Rule of 3, if the 2 Merchant, of 21 $\frac{2}{11}$ do make but $\frac{20}{1}$, how much shall he

lose in the $\frac{100}{1}$? multiply and divide, & you shall find $91\frac{2}{3}$ the which being abated from 100, there will remaine $8\frac{1}{3}$. And after the rate of $8\frac{1}{3}$, doth the second Merchant lose in the 100. And consequently, the first Merchant of 20 d. maketh 21 d. $\frac{9}{11}$, and therefore say againe by the Rule of Three, if the first Merchant of $\frac{20}{1}$ do make $21\frac{9}{11}$, how much shall he gain upon $\frac{100}{1}$? multiply & divide, and you shall finde 109 l. $\frac{1}{11}$. And thus the first Merchant gaineth after the rate of 9 l. $\frac{1}{11}$ upon the 100l. of money.

Note. For your better understanding of these questions, you must note that when one Merchant gaineth of another after the rate of 10 l. upon the 100 l. he gaineth the $\frac{1}{10}$ of his owne principall, and the other which loseth after the rate of $9\frac{1}{11}$ in the 100 l. he loseth the $\frac{1}{11}$ of his principall. And it may be proved thus: when one Merchant will sell his wares unto another: which wares stand him but in 100 li. and he will sell them for 110 l. therefore he of his 100 l. maketh 110 l. and so he gaineth after 10 l. upon the 100, which is the $\frac{1}{10}$ of his principall, & the other which buyeth wares for 110 li. that cost the other but 100 l. of the 110 l. he maketh but 100 l. And therefore, say by the Rule of Three, if 110 be come of

100

100, how much shall come 100? multiply and divide, and you shall finde 90 $\frac{10}{11}$ the which abate from 100, and there will remaine 9 $\frac{1}{11}$ of which is the $\frac{1}{11}$ of the principall that the second loseth in the 100 l. as before is said. And therefore, who so that will know what one Merchant gaineth of another, either after the rate of 10 l. upon the 100 l. which is the $\frac{1}{10}$ of his principall, or else after the rate of 20 l. upon the 100 l. which is the $\frac{1}{5}$, or of any other part, & that he would likewise know what part the other loseth of his principall, he must take for the numerator of the broken number of him that loseth, as much as for him that gaineth, then adde the numerator and the denominator (of the broken number of him that gaineth) both together, and make thereof the denominator of the broken number of him that loseth, & then shall you have the just part of him that loseth: as by example of him that gaineth after 10 l. upon the 100 l. which is the $\frac{1}{10}$ of his principall: take the numerator of $\frac{1}{10}$ which is 1, and make that the numerator of the broken number of him that loseth, then add 1, which is the numerator of the fraction of him that gaineth with 10, which is his denominator, & you shall have 11 for the denomina-

for of the fraction of him that loseth. Then put 1 over the 11, and so you shall have $\frac{1}{11}$. Thus it appeareth when one Merchant gaineth of another after 10 l. upon the 100 l. he gaineth the $\frac{1}{10}$ of his principall, and the other loseth $9\frac{1}{11}$, which is the $\frac{1}{11}$ of his principall. And if he would gaine after 20 upon the 100 l. which is the $\frac{1}{5}$ of his principall, the other should lose $16\frac{2}{3}$, which is the $\frac{2}{6}$ of his principall, and so is to be understood of all all other fractions.

4. Two Merchants will change their merchandize, the one with the other, the one of them hath Sayes of 20 s. and 10 d. the piece to sell for ready money: and in barter he will sell the piece for 23 s. 4 d. and yet he will gaine moreover, after 10 l. upon the 100 l. The other hath Wool of 50 shil. the 100 weight to sell for ready money. I demand how he shall sell C. of Wool in barter? Answ. Say if 20 s. 10 d. which is the just price of the piece of Say, be sold in barter for 23 s. 4 d. for how much shall 50 s. (which is the just price of the C. of wool) be sold in barter? multiply and divide, and you shall finde 56 s. Then for because the first Merchant will gaine after 10 l. upon the 100 l. he maketh of his 100 l. 110 l. so the second Merchant ma-

ketb

keth of 110 l. but 100 l. And therefore say by the Rule of Three, if the second Merchant of 110 do make but 100, how much shall he make of 56? multiply and divide, and you shall finde 50 s. 10 d. $\frac{10}{11}$ of a peny, & for so much shall he sell the C. of Wool in barter.

5. More, two Merchants will change their merchandize the one with the other, the one of them hath Taffata of 16 crowns the piece, to sell for ready money, & in barter he will sell the piece for 20 Crowns, & yet he will gaine moreover after the rate of 10 l. upon the 100 l. The other hath Ginger of 3 s. 9 d. the pound weight, to sell in barter. I demand what the pound did cost in ready money? Ans. Say if 20 crownes which is the surprice of the piece of Taffata, become of 16 crownes the just price, of how much shall come 3 s. 9 d. which is the surprice of the pound of Ginger? multiply and divide, and you shall finde 3 shil. Then, for because that the Merchant of Taffata will gaine after the rate of 10 upon the Hundred: Say if one Hundred doe give 100, what shall 3 s. give? multiply and divide, and you shall finde 3 s. 3 d. $\frac{3}{5}$, and so much did the pound of Ginger cost in ready money.

6. more, two merchants will change their merchandize, the one with the other, the one of them hath Worſteds of 25 s. the piece to ſell for ready money, and in barter he will ſell the piece for 33 s. 4 d. and yet he loſeth after 10 l. in the 100 l. the other hath War of 3 l. 6 s. 8 d. the 100 weight to ſell for ready money. I would know for what price he ſhould ſell his War in barter? Anſw. Say if 25 s. which is the juſt price of the piece of Worſted be ſold in barter for 33 s. 4 d. for how much ſhall 3 l. 6 s. 8 d. be ſold? which is the juſt price of the C. of War, as it was worth in ready money: multiply and divide, and you ſhall finde 4 l. $\frac{4}{9}$ which is 8 s. 10 d. $\frac{2}{3}$, then for becauſe that the Merchant of Worſteds, loſeth after 10 l. in the 100 l. of 100 l. he maketh but 90, and therefore ſay, if 90 give 100, what giveth 4 l. $\frac{4}{9}$? multiply and divide, and you ſhall finde 4 l. $\frac{76}{171}$, which is worth 18 s. 9 d. $\frac{5}{27}$, and for ſo much ſhall he ſell the 100 l. weight of War in barter.

7. More, two Merchants will change their Merchandize the one with the other: the one of them hath Worſteds of 5 l. 6 s. 8 d. the piece to ſell for ready money, and in barter he will ſell the piece for 6 l. 13 s. 4 d. & yet he loſeth after 10 l. in the 100.

and

and the other hath Muske of 2 s. 9 d. $\frac{1}{3}$ the pound weight to sell in barter. I demand what the pound did cost in ready money? Answ. Say if 6 l. $\frac{2}{3}$, which is the over-price of the peice of Worsted, become of 5 l. $\frac{1}{3}$, which is the just price of the same, of how much shall come 2 s. 9 d. $\frac{1}{3}$? multiply and divide, and you shall find 2 s $\frac{2}{9}$, which $\frac{2}{9}$ is 2 d. $\frac{2}{3}$: then for because that the Merchant of Worsteds loseth after 10 l. in the 100 l. of a 100 he maketh but 90, and therefore say, if 100 give but 90, how much shall 2 s. $\frac{2}{3}$ give? multiply and divide, and you shall 2 s. and so much cost the pound of Muske in ready money.

Other Rules of Barter, wherein is given some part in ready money.

WHen a Merchant overselleth his Merchandize, and he will have also some part of his over-price in ready mony: as the $\frac{1}{2}$, the $\frac{1}{3}$ or the $\frac{1}{4}$, &c. He must subtract the same part of mony frō the just price, & also from the over-price of his Merchandize: and the two numbers that remaine after the subtraction is made, shall be the two first numbers in the Rule of Three: and the just price of the second Merchant shall be the third number: to know how

how many he shall over-sell the part of his merchandize

Example.

8. Two Merchants will change their merchandize the one with the other, the one of them hath fine Wool at 5 l. the 100 pound weight to sell for ready money, and in barter he will sell it for 6 l. and yet he will have the $\frac{1}{3}$ in ready money. The other hath cloth of 13 s. 4 d. the yard to sell for ready money. I would know how he shall sell the same in barter? Answ. take the $\frac{1}{3}$ of 6 l. which is the over-price, of the 100 of Wool, and that is 2 l. the which you must abate from 5 l. which is the just price of the C. of Wool, and also abate it from 6 l. which is the over-price, and there shall rest 3 l. and 4 l. for the two first numbers in the Rule of Three; then take 13 s. 4 d. which is the just price of a yard of cloth, for the third number: Then multiply and divide, and you shall find 17 s. 9 d. $\frac{1}{3}$, for so much shall the second sell his cloth in barter.

9. More, two Merchants will change their merchandize the one with the other, the one of them hath War of 3 l. 6 s. 8 d. the C. to sell for ready money, & in barter he will sell the same for 4 l. 3s. 4 d. and yet he

he will have the ¼ in ready money. And the other hath fine crimſon Satten of 15 s. the yard, to ſell in barter, I demand what it is worth in ready money? Anſw. Take the ¼ of 4 l. 3 s. 4 d. which is 1 l. 0 s. 10 d. and abate it from 4 l. 3 s. 4 d. and alſo from 3 l. 6 s. 8 d. and there reſteth 3 l. 2 s. 6 d. and 2 l. 5 s. 10 d. for the two firſt numbers in the Rule of Three. And 15 s. for the third number, which 15 s. is the over-price of the yard of Satten. Then multiply and divide, and you ſhall finde 11 s. And ſo much did the yard of Satten coſt in ready money.

10. Two Merchants will change their merchandize the one with the other: the one of them hath Tin of 50 s. C. weight, to ſell for ready money, and in barter he will ſell it for 3 l. 6 s. 8 d. and he will gaine after 10 l. upon the 100 l. yet he will have alſo the one halfe in ready money. The other hath Lead of 3 half-pence the pound, to ſell for ready money. I demand how he ſhall ſell the pound of Lead in barter? Anſ. See firſt at 10 l. upon the 100 l. what the 3 l. ⅓ will come unto, in ſaying by the Rule of Three, if 110 give 100 what will 3 ⅓ give? multiply and divide, and you ſhall find that they will come to 3 l. ⅓. which is 13 s. 4 d. of the which, the halfe which he demandeth

in

in ready money, is 36 s. 8 d. the same being abated from 50 s. and also from 3 l. 13 s. 4 d. there will remaine 13 s. 4 d. and 1 l. 16 s. 8 d. for the two first numbers in the Rule of Three, which you must put all into halfe-pence, and the aforesaid three halfpence shall be the third number, and then multiply and divide, and you shall find 4 d. ½. and for so much shall he sell the 1 l. of Lead in barter.

11. More, two Merchants will change their merchandize the one with the other: the one of them hath Steel of 16 s. 8 d. the 100 l. weight, to sell for ready money, and in barter he will sell it for 25 shil. and yet he loseth after 10 li. in the 100 li. but he will have the ½ in ready money: the other hath Iron of 6 s. 8 d. the C. to sell in barter. I demand what the hundred of Iron did cost in ready money? Answer. Say if 100 come but to 90, how much shall 25 s. come to? multiply and divide and you shall find 22 s. 6 d. of the which number, take the ⅕ which is 11 s. 3 d. and subtract it from 22 s. 6 d. and also from 16 s. 8 d. and there will remaine 11 s. 3 d. and 5 s. 5 d. for the two first numbers in the Rule of Three, and 6 s. 8 d. which is the over-price of a C. of Iron for the third number: then multiply

and

and divide 4, you ſhall finde 3 s. 2 d. $\frac{14}{27}$: and ſo much did the C. of Iron coſt in ready money,

12. More, two Merchants will change their merchandize the one with the other: the one of them hath Hates of 20 s. 10 d. the piece to ſell for ready money, and in barter he will ſell the piece for 25 s. & he will have the $\frac{1}{4}$ in ready money. The other hath Caps of 35 s. the dozen, to ſell for ready money, but he will gaine after the rate of 10 l. upon the 100 l. I demand how he ſhall ſell a dozen of Caps in barter? Anſw. Say if 100 be worth 110, what ſhall 35 ſhil. be worth, which is the juſt price of the dozen of Caps? multiply and divide, and you ſhall finde 38 ſhil. 6 d. then take $\frac{1}{4}$ of 25 s. which is 6 s. 3 d. and ſubſtract it from 20 s. 10 d. and alſo from 25 s. and there will remaine 14 s 7 d. and 18 s. 9 d. for the two firſt numbers in the Rule of Three, and 38 s. 6 d. which is the juſt price with his gaine in the dozen of Caps for the third number: then multiply and divide, and you ſhall finde 49 s. 6 d. and for ſo much he ſhall ſell the dozen of Caps in barter.

Chap. 8.
Of Exchanging of Money from one place to another.

First you must note, that at Antwerpe they use to make their accounts by Denters de gros, that is to say, by pence Flemmish, whereof 12 doe make 1 shil. Flemmish, & 20 shil. Flemmish doe make 1 l. de gros.

Example.

1. If I deliver in Flanders 500 l. Flemmish at 19 s. 6 d. de gros, that is to say, at 19 s. 6 d. Flemmish, to receive 20 s. at London; I demand how much I shall receive sterling at London for the said 500 l. Flemmish? Ans. Say if $19\frac{1}{2}$ give $\frac{20}{1}$, what will $\frac{500}{1}$ give? multiply and divide, and you shall finde 512 l. 16 s. 4 d. $\frac{12}{13}$ of a d. And so much sterling shal I receive in London for my 500 l. Flemmish.

2. If I deliver in London 375 l. sterling to receive in Antwerp 2159 d. the gros, that is to say, Flemish, for every sterling, I demand how many pounds Flemmish I shall receive in Antwerp for the said 375 l. sterling? Answ. Say if $\frac{21}{1}$ give $21\frac{3}{4}$ what will $\frac{375}{1}$, give? multiply and di-

vide and you ſhall finde 470 l. 16 ſhil, 3 d. ſo many pounds Flemmiſh ſhall I receive at Antwerp for the ſaid 375 l. ſterling in Antwerp.

3. If I take up money at Antwerp. after 19 s. 6 d. Flemiſh, to pay for the ſame at London 20 s. ſterl. and when the day of payment is come, I am forced to returne the ſame, and to take up money againe in London to pay my Bill of Exchange, ſo that for 20 s. which I take up here I muſt pay 19 s. 6 d. at Antwerp I demand whether I doe win or loſe, and how much in, or upon the 100 l. of money? Anſ. Say, if 19 $\frac{3}{4}$ give 19 $\frac{1}{2}$, what will $100\frac{0}{1}$ give? multiply & divide, and you ſhall finde 98 $\frac{58}{79}$, the which being abated from 100, there will remain 1, $\frac{21}{79}$. And ſo much doe I loſe upon the 100 l. of money.

4 If I take up at London 20 s. ſterling to pay at Antwerp, 21 s. 8 d. Flemmiſh; and when the day of payment is come, my Factor is conſtrained to take up money againe at Antwerp, wherewith to pay the foreſaid ſum: and there he doth receive 22 ſhil. Flemmiſh, for the which I muſt pay 20 s. at London. Now I demand whether I doe win or loſe, and how much upon the 100 l. of money after the rate? Anſ. Say, if

$21\frac{2}{3}$ give $\frac{22}{1}$, what will $\frac{120}{1}$, give? multiply and divide, and you shall finde $101\frac{7}{13}$, from the which abate 100, and there will remaine $1\frac{7}{13}$, and so much shall I gaine upon the 100 l. of money.

The Exchange from London into France, is not like as it is in Flanders, but is delivered by the French Crowne, which is worth 50 Souse Tournoies the piece.

And here must you note, that in France they make their account by deniers Tournois, whereof 12 Deniers maketh 1 Souse Tournois, & 20 Souse Tournois maketh 1 l. Tournois, which they call a Livre or Franc, and the French Crowne is currant among Merchants for 51 Souse Tournois, but by exchange it is otherwise, for they will deliver but 50 Souse Tournois, which is 2 l. 10 Souse Tournois for a Crowne, and at such price the Crowne, as the Taker up of money can agree with the Deliverer.

Example.

5. If I deliver 340 l. ster. here in London, after 6 s. 4 d. sterling the Crowne, to receive at Roan, or at Paris 50 Souse Tournois for every Crowne. I would know how many Livres Tournois I shall receive

receive there for my 340 l. sterling? Answ. Say if 6 shil. $\frac{1}{3}$ sterling doe give me 2 l. $\frac{1}{2}$ Tournois, what will $680\frac{1}{1}$ s. give? (which is the 340 l. reduced into shillings.) Then multiply and divide, and you shall finde 2684 Liures $\frac{4}{19}$ which is worth 4 sous $\frac{4}{19}$ Tournois, and so much shall I receive in Roan or Paris for my 340 l. sterling.

6. If I deliver in Paris or Roan, or elswhere in France 1250 Liures Tournois, at 50 sous Tournois the Crowne, to receive for every such Crown 6 s. 3 d. sterling in London. I demand how much sterling money I shall receive at London for my 1250 pound Tournois? Answer: Say if 2 l. $\frac{1}{2}$, doe give me 6 s. $\frac{1}{4}$, what will $1250\frac{1}{1}$ give? multiply and divide, and you shall finde 3125 s. sterling, which maketh 156 l. 5 s. sterling. And so many pounds shall I receive at London for the said 1250 Liures Tournois, after 6 s. 3. d. for every Crown of 50 sous.

CHAP. XIII.

Of the Rule of Alligation or Mixture.

The Rule of Alligation is so named for that it teacheth to alligate or bind together divers parcels of sundry prices, and to know how much you shall take of every parcel, according to the numbers of the question, the which Rule is distinct into two parts: as followeth.

The first part of the Rule of Alligation sheweth how to make a mixture of divers thing being of sundry prices: And of the same thing so mixed to know the common price of the said mixture.

Example.

1. A man would mix 5 bushels of Wheat at 2 s. 8 d. the bushel, with 9 bushels of Rie, at 2 shil. the bushel, and would know how much the bushel so mixed doth stand him in, the one with the other? Answ. For to know the same common price, you must multiply every thing by his price, and adde all the products together: the which you must divide by the number of all the things that are to be mixed, and the quotient will answer

anſwer to the queſtion, as in the aforeſaid example, I multiply 5 buſhels by his price, that is to ſay by 2 s. 8 d, and thereof cometh 13 s. 4 d. Likewiſe I multiply 9 buſhels by 2 s. maketh 18 s. both theſe ſums added together, do make 31 s. 4 d. the which I do reduce into pence: and they make 376 pence. Then I divide 376 by 14, which is the number of all the buſhels, and my quotient will be 26 pence and $\frac{6}{7}$, and ſo much doth one Buſhel of both the ſorts of grain ſtand him in.

2. If you have two ſeveral things, whereof you would mix equal portions together, you muſt adde their prices, and take onely the $\frac{1}{2}$: if you would mix together equal portions of three things, you muſt take $\frac{1}{3}$; and of foure, the $\frac{1}{4}$, & ſo continuing, as by Example: Wheat of 2 s. 8 d. the buſhel, and Rie of 2 s. the buſhel being mingled by equal proportions I adde 2 s. 8 d. and 2 s. together, and they make 4 s. 8 d. whereof the one $\frac{1}{2}$ is 2 s. 4 d. & ſo much is the value of 1 buſhel of ſuch a mixture. And if there were a portion of Barly at 20 d. then I muſt add 2 s 8 d. 2 s. & 20 d. together and they make 6 s. 4 d. whereof the $\frac{1}{3}$ which is 2 s. 1 d. $\frac{1}{3}$ ſhould be the price of 1 buſhel of that mixture.

3. A Merchant hath 27 l weight of large Cloves at 6 s. the l. 15 l. of the middle sort at 2 s. 6 d. the l. And 10 l. of Fust, at 2 s. 2 d. the l. when all that same are mixed together, I would know how much the l. is worth? Answer. You must multiply every drug by his price, and then divide the totall summe of the products, by the whole weight of the drugs, and you shall finde 4 shill. 3 d. $\frac{1}{26}$, and so much is the pound of that mixture worth.

27	at	6 s. 0 d.	162
15	at	2 s. 6 d.	$37\frac{1}{2}$
10	at	2 s. 2 d.	$21\frac{2}{3}$
52			$221\frac{1}{6}$.

4. And if you would mix $\frac{1}{2}$ large Cloves, $\frac{1}{3}$ of middle, and $\frac{1}{4}$ of Fust, and you would know how much the pound weight were worth, you must take a number which containeth those parts: as for example 12; whereof the $\frac{1}{2}$, which is 6 shall signifie so many l. of large Cloves: The $\frac{1}{3}$ which is 4, shall be so many l. of the middle, and the $\frac{1}{4}$, which is 3. shall be so many l. of Fust. Then afterwards you must multiply every drug by his price, and divide the totall summ of all the products, by the whole summ of the

the drugs, and you shall finde 4 s. $\frac{1}{12}$. And so much is 1 pound weight of the mixture.

6. at 6 s. 0 d.	36	
4. at 2 s. 6 d.	10	
3. at 2 s. 2 d.	06$\frac{1}{2}$	
13	52$\frac{1}{2}$	

5. And if you would make 100 l. weight of such a mixture, you shall worke by the Rule of Company, and you shall find 46 l. $\frac{2}{13}$ of large Cloves, 30 l. $\frac{10}{13}$ of middle, And 23 $\frac{1}{13}$ of Full.

6	13	100	6? Ans. 44 $\frac{2}{13}$
4			4? Ans. 30 $\frac{10}{13}$
3			3? Ans. 23 $\frac{1}{13}$
13		100	

6 A Gold-smith hath 6 l. weight of silver bullion of 7 ounces fine, more 15 l. of 8 ounces $\frac{1}{2}$ fine, and 13 l. weight of 10 ounces fine, and he will melt all these together, and make of them one masse. The question is to know of what fineneſſe the Pound weight is? Answ. You must multiply the number of the weights of every Bullion by his fineneſſe, and thereof will come the ounces and parts of ounces fine, the which you must adde together, and they

will make 313 ounces $\frac{1}{2}$ of fine, the same you must divide by 36 which is the whole sum of the pound weight of Bullion, and you shall find 8 ounces and $\frac{12}{72}$ remaining, which $\frac{12}{72}$ parts of an ounce is worth 14 peny weight and 4 grains, and so much is the pound weight of this mixture worth.

8 Lib.	at 7 ounc. is	56
15	at 8 ounc. $\frac{1}{2}$ is	127$\frac{1}{2}$
13	at 10 ounc. is	130
36		313$\frac{1}{2}$

7. A Goldsmith hath 3 sorts of Silver Bullion, that is to say, 5 l. 7 ounces 10 peny weight, at 7 ounces $\frac{1}{2}$ fine; 12 l. 3 ounces, at 6 ounc. $\frac{1}{3}$ fine. And 4 l. at 9 ounces fine. All the which he will melt into one masse. The question is to know, of what fineneſſe the l. weight of that mixture shall be? Answer. You must multiply every Bullion by his fineneſſe, as afore. And adde together all the produes, & they doe amount to 155 l. $\frac{37}{48}$. Then add all the weights of the Bullions together into one sum, and they make 21 l. $\frac{7}{8}$, divide then 155 $\frac{37}{48}$ by 21 $\frac{7}{8}$, and your quotient will be 7 ounces & $\frac{1016}{8490}$ remaining, the which $\frac{1016}{8490}$ being brought into peny weights and grains, doe make 2 peny weight, 10 grains $\frac{2}{35}$ of a graine fine:

fine: So you may perceive that the ſame mixture is of 7 ounces, 2 d. 10 grains, and $\frac{2}{17}$ of a grain fine the pound weight.

And here is to be noted, that the reckoning of the weight of Silver is thus as followeth that is to ſay,

1 Pound of Troy weight, maketh 12 Ounces.

1 Ounce is divided into 20 peny weight.

1 Peny weight is diſtributed into 24 grains.

1 Grain into 20 ſmaller parts, &c.

And the reckoning for Gold, is thus,

1 Ounce of fine Gold without any alloy, is imagined to be 24 karets.

1 Karet is divided into 4 grains.

1 Grain is parted into 2 half grains or 4 quarters of a grain, &c.

And ſo into other ſmaller parts.

8 But if the ſaid Goldſmith would put 5 l. weight of Copper with the ſaid Bullions, and you would know of what fineneſſe it is, then you muſt adde the ſame 5 l. with the 21 l. $\frac{7}{11}$, and it maketh 26 $\frac{7}{11}$. Then divide the aforeſaid 157 l. $\frac{7}{44}$. by 26 l. $\frac{7}{11}$, and you ſhall finde 5 ounces fine, and $\frac{8216}{10320}$ remaining, the which $\frac{8216}{10320}$ is worth 15 peny weight, 22 grains and $\frac{6}{43}$. And of that fineneſſe will the ſame maſſe be.

9. A Gold-smith hath melted 12 pound weight, and 5 ounces of Gold Bullion, being of 18 Karets fine, with 4 l. weight, 4 ounces and $\frac{1}{2}$, at 21 Karets fine; I demand of what finenesse is 1 l. weight of the same masse? Answer. You must multiply the weights (by the Karets fine) of each sort, and adde the products together, the same you must divide by the whole sum of all the weights added together, and your quotient will shew you of what finenesse the same is of, as in the former example, I doe multiply 12 l. and 5 ounces by 18 Karets, and thereof commeth 223 Karets $\frac{1}{2}$. Likewise I doe multiply 4 l. weight, 4 ounces $\frac{1}{2}$, by 21 Karets, and thereof cometh 91 Carets $\frac{7}{8}$, these two summes of Karets I do adde together, and they make 315 Karets $\frac{3}{8}$. Then I do adde 12 l. weight 5 ounces, and 4 l. weight 4 ounces and $\frac{1}{2}$ together, and they make 16 l. 9 ounces $\frac{1}{2}$, the which 9 ounces $\frac{1}{2}$ are $\frac{19}{24}$ parts of a pound: and therefore I divide 315 $\frac{3}{8}$ by 16 l. $\frac{19}{24}$, and thereof commeth 18 Karets, and $\frac{2520}{3224}$ remaining, which fraction is 3 graines, and $\frac{252}{403}$ parts of a graine. And of that finenesse is 1 pound weight of the said masse.

A Gold-smith hath melted 10 pound weight,

weight, 7 ounces, and $\frac{1}{8}$ of 20 Karets, and $\frac{1}{3}$ fine. And 8 pound weight, 2 ounces and $\frac{1}{6}$ parts of 23 Karets fine, with 15 pound weight, 1 ounce of Silver. The question is of what fineneſſe is the pound weight of the ſaid maſſe? Anſwer. You muſt multiply the weight of every ſort of Gold bullion by his allay, that is to ſay, by his fineneſſe, and adde all the products together, and you ſhall finde 405 $\frac{25}{96}$ Karets, then adde the weight of the two ſorts of Gold bullion, with the weight of the Silver together, and thereof will come 33 pound, 11 ounces $\frac{5}{24}$, the which 11 ounces $\frac{5}{24}$ is $\frac{269}{288}$ of a pound weight, then divide the ſaid 405 $\frac{25}{96}$ parts by 33 pounds $\frac{269}{288}$, and you ſhall finde 10 Karets $\frac{4295}{26387}$. And of the ſame fineneſſe ſhall the pound weight of that maſſe of Gold be.

The ſecond part of the Rule of Alligation.

1. A Goldſmith hath 4 ſorts of Gold, The firſt is worth 30 Crownes the pound weight; the ſecond is worth 36 Crowns; and the third is worth 42 Crownes; and the fourth is worth 45 Crownes; and of theſe 4 ſorts he will make a Scepter of 6 l. weight, which ſhall be worth 40 Crowns

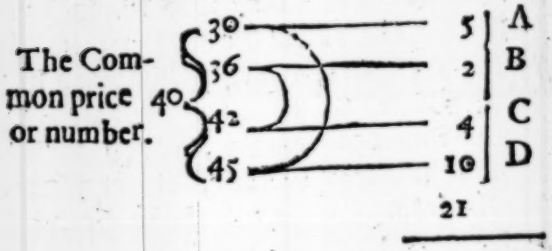
the

the pound, I demand how much he must take of every sort? Answer. First you must set down the numbers whereof you will make the alligation (which are 30, 36, 42, and 45) orderly the one under the other, after the same manner, as if you would add them together: and the common number whereunto you will reduce them, you shall set on the left hand, which common number in this example is 40. Then marke which of the said four numbers are lesser then that common number, and which of them be greater, and with a draught of your pen, evermore link two numbers together, so that the one be lesser than that common number, and the other greater than it, for two greater, nor two smaller numbers may not be linked together, for they will be either lesser, or else greater than the common number, but one greater number, and one smaller may be so mixed, that they will make the common number. And two greater or two smaller numbers, can never make the common number in due order, as hereafter shall appear.

After that you have thus linked them, then mark how much each of the lesser numbers is smaller than the common number, & that difference you shall set against

the

the greater numbers which be linked with thoſe ſmaller, each of them with his match ſtill on the right hand. And likewiſe you muſt ſet the exceſſe of the greater numbers againſt the leſſer, which be combined with them. Then ſhall you adde all thoſe differences into one ſumme, which ſhall be the firſt number in the Rule of Three, and the ſecond number ſhall be the whole maſſy piece that you will have of all the particulars, which in this example was preſuppoſed to be 6 pound. Then the third ſumme ſhall in each difference by it ſelfe, and by them you ſhall finde out the fourth number, declaring the juſt portion that you ſhall take of every particular in that mixture, as now by the former example, I will make it more plaine.



21 6 5 | | 21 6 2
21 6 4 | | 21 6 10

Here in this former example, you ſee that I have ſet downe the ſeverall prices, which be 30, 26, 42, 45, and have linked together 30, with 45; and 36, with 42. The common price 40. I have ſet on the left ſide, as before is declared, and the difference of it from every ſeveral price, I have ſet on the right hand, againſt that ſumme with the which it is linked. So the difference of 30, from 40, is 10, which I ſet againſt 45, that he is linked withall; and the difference of 45, above 40 is 5, which I have ſet againſt 30. So likewiſe, the difference of 42, above 40, is 2, that I have ſet againſt 36. And the difference betweén 36 and 40 (which is 4) I have ſet againſt

42

42. Then I adde all those differences together, namely 5, 2, 4, and 10, and they make 21, which I make the first number in the Rule of Three, and 6 pound which is the weight of the Scepter of Gold the second number, and the third number shall be every particular difference for every severall working. Then worke by the Rule of Three: saying if 21 (which is all the differences added together) doe give me 6 pound weight, which is the weight of the Scepter, what shall 5 give, which is the first difference? I multiply and divide, and I finde 1 pound weight $\frac{3}{7}$, so much must I have of the first price. Then I doe in like manner with the rest, and I finde $\frac{4}{7}$ of a pound weight of the second price, 1 pound $\frac{1}{7}$ of the third price: and 2 l. $\frac{6}{7}$ of the fourth; the which 4 sums being added together, doe make 6 li. which is the whole weight of the Scepter that I would have. And now to prove if the pieces doe agree, you shall doe thus: First multiply this totall summe 6 by the common price 40, and it will make 240 Crowns, which you shall keepe by it selfe. And afterward multiply every severall summe of weight by the price belonging to the same weight, and if that summe doe agree with

the

the first that you kept by it selfe, then is your worke well done, as here 1 l. $\frac{3}{7}$, is the weight of the sort of Gold which is of 30 crowns price. Therefore multiply 30 by 1 l. $\frac{3}{7}$, and it maketh 42 crowns $\frac{6}{7}$, which you must set down. Then multiply $\frac{4}{7}$ (which is the weight of the second sort of Gold) by 36, which is the price of the same, and thereof cometh 20 crowns $\frac{4}{7}$: so again 1 l. $\frac{1}{7}$ multiplied by 42 crowns, which is the third price, doth make 48 crowns. And last of all 2 l. $\frac{6}{7}$ multiplied by 45, maketh 128 crowns $\frac{4}{7}$. All these being added together, doth make 240 crowns agreeable to the former summe of 40, multiplied by 6. And thus I may affirme that this worke is well done.

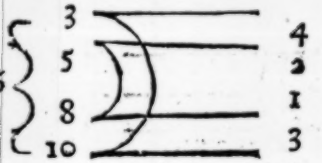
2. A Tavernier hath 4 sorts of Wine of 4 severall prices; the first of 8 d. the Gallon; the second of 10 d. the Gallon; the third of 15 d. and the fourth of 18 d. And he will mix all these sorts together, so that the Gallon shall be worth but 12 d. I demand how many gallons he must take of every sort? Answ. First suppose the Puncheon to hold some certain measure, as to contain 84 Gallons, and then the form will be after this sort, as you see hereafter following.

If 15 doe give 84.

What will 3 give? They make $16\frac{4}{5}$ of the 1.
What will 6 give? $33\frac{3}{5}$ of the 2.
What will 4 give? $22\frac{2}{5}$ of the 3.
What will 2 give? $11\frac{1}{5}$ of the 4.
84

3 A Mint-maſter hath 4 ſorts of ſilver Bullion of theſe fineneſſe following. The firſt is of 3 ounces fine; the ſecond of 5 ounces fine; the third of 8 ounces fine; and the fourth of 10 ounces fine. And of all theſe 4 ſorts, he would make another ſort, that ſhould be but of 6 ounces fine. The queſtion is to know what portion he muſt take of every of the ſaid Bullions? Anſwer Set downe the particuler fineneſſe, ỳ one under the other; namely 3, 5, 8, & 10, and ſet 6 which is the common fineneſſe, before them toward your left hand, as here you may ſee.

6



Then put the difference of 3 from 6 right against 10, and the difference of 6 from 10, which is 4 right against 3. Likewise the difference of 5 from 6 which is 1, right against 8 and the difference of 6 from 8, which is 2, right against 5. This done, you shall conclude, that for every 4 pound weight that he taketh of the Bullion of 3 ounces fine, he must take 2 pound of the Bullion of 5 ounces fine, and 1 l. weight of the Bullion of 8 ounces fine, and 3 l. weight of that which is of 10 ounces fine. Or else if you please, adde 4 2 1, and 3 together, so they make 10, which shall be the denominator of every of the portions, that is to say, you shall take $\frac{4}{10}$ of the Bullion of 3 ounces fine $\frac{2}{10}$ of that which is of 5 ounces fine $\frac{1}{10}$ of that of 8 ounces fine, & $\frac{3}{10}$ of that which is of 10 ounces fine. And so of all such like. And if you would make 60 pound weight of such a mixture, you must adde 4, 2, 1, & 3, together, which maketh 10, & then worke by the Rule of Company, saying, if 10 l. give 60 l. what will 4 give? and

so

so likewise, what will 2 give, &c. This some may be varied, by combining the particular values after this manner, as here you do see, and as in the other example, it is plain.

4. Sometimes the value doth change his difference, and is linked unto divers, for to represent the portion that is to be taken of every thing, as by example: A Merchant hath Wheat of 2 s. 8 d. the bushel; Rie of 2 s. and Barley of 16 d. the bushel, and he will make a mixture of these sorts which shall stand him but in 22 d. the bushel. It is demanded how much he may take of every sort of the said grain? Answ. Put the difference of 22 from 32 and 24 right against the 16. And likewise the difference of 16 from 22 right against 32 and against 24: And you shall finde for 6 bushels that he taketh of Wheat, he must take 6 bushels of Rie, and 12 bushels of Barley.

d.

22 { 32 —— 6
24 —— 6
16 —— 10, & 20, 12.

5. A Mint-master hath Bullion of 9 ounc. 10 peny weight fine, and of the same he would make money, which should be but of 6 ounces fine, and therefore it behoveth him to melt copper therewith, which is valued at 0 peny weight of fine. The question is to know how much silver and copper he must mixe together? After that you have put down 9 ounc. $\frac{1}{2}$ for the value of the silver, and right under the same 0 for the copper, you must take the difference of 6 from 9 $\frac{1}{2}$ which is 3 $\frac{1}{2}$ and place the same sum right against the 0, for to signifie the portion of copper that he must take:

And the difference of 0 from 6 is 6: the same you must set right against 9 $\frac{1}{2}$, which shall represent the portion of silver that he must take.

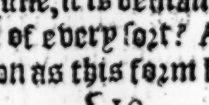
9 $\frac{1}{2}$	6 l. fil.
0	3 l. $\frac{1}{2}$ coper.

And thus you see that for 6 pound of silver that he taketh he must take 3 pound $\frac{1}{2}$ of copper to make the said money of 6 ounces fine.

An

And if he had 3 sorts of Silver Bullion, that is to say, of 6 ounces fine, of 7 ounces fine and of 9 ounces fine, and he would make money thereof which should be but of 5 ounces fine, it behoveth him to mixe copper therewith. And this forme following doth shew how the same must be combined, and likewise how much he must take of every sort.

6. Likewise a Mint-master hath Bullion of Gold, at 19 Karets fine, some at 22 Karets fine, some at 24 Karets which is full fine without corruption, and he will make coyne thereof which shall be 23 Karets fine, it is demanded how much he must take of every sort? Answ. make your Alligation as this forme here under sheweth.



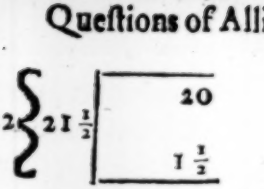
Yore, the said Master hath Gold of 20 Karets $\frac{1}{2}$ fine, and of 22 Karets fine, and he will allay the same to 18 Karets fine. And

for to do the same, it is convenient for him to mix Silver therewith, which is esteemed at 0 Karets fine, but proceeding according to this Rule, he shall find that for 18 pound weight, or other portions that he taketh of the 2 sorts of Bullion of Gold, he must take 6 pound weight and $\frac{1}{2}$ of Silver to allay the same unto 18 Karets fine.

$$18\left\{\begin{array}{l}20\frac{1}{2} \text{ —— } 18\\ 22 \text{ —— } 18\\ \hline 0 \text{ —— } 2\frac{1}{2}4, \text{ that is } 6\frac{1}{2}\end{array}\right.$$

7. Again, the said Maker hath 100 l. weight of Gold at 22 Karets fine, and 20 pound weight at 19 Karets fine, the which he will allay to 20 Karets fine. The question is, whether he ought to mix any Silver with the same, yea or no, and how much? Answer. You must consider (by the first part of the Rule of Alligation) the allay of the 100 l. and of the 20 l. being melted together, & you shall finde that the same is of 21 $\frac{1}{2}$ Karets fine; and therefore forasmuch as the same is yet of a better fineneſſe than he would have it, he must therefore mix Silver therewith, that is to say, for 20 l. weight or portions of Gold he must take thereto 1 l. $\frac{1}{2}$ of Silver.

22



8. If he had 1 l. weight fine Silver of 12 ounces fine I demand how much Copper he muſt mix with the ſame, to allay it unto 11 ounces 1/4 fine, that is to ſay, to 11 ounces 5 d. weight fine? Make your Alligation as before is taught. Then divide the portion of Copper by the portion of fine, and you ſhall find 3/4, which being abbrevied, is 1/5. And thus to every l. weight of Silver, you muſt take 1/5 of a l. of Copper, and for every 11 pound 1/4 of Silver, you muſt take 1/4 of a l. of Copper. And ſo is ſo be done with the ſame, in caſe that it were of any other allay.

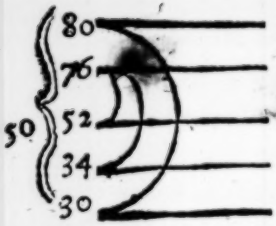
9. A Maſter hath 1 l. of fine Gold of 24 karets fine, the which he would allay to 22 karets fine, The queſtion is to know how much Silver muſt be mixed with the ſame, that it may be of the fineneſſe of 22 karets as before? Anſw. Take the difference of 22 to 24, which is 2, then divide 2 by 22, which you cannot, for they are 2/22, but abbrevie them, and it is 1/11. And ſo much ſilver muſt be mixed with 1 l. weight of fine gold that the ſame may be of 22 karets fine

10. A Gold-smith hath 1 l. weight of Silver Bullion of 7 ounces fine, it is demanded how much fine Silver he must put to the same, that being molten together, it may be of 10 ounces fine? Answ. make your alligation of 7, and 12 unto 10, and then divide the portion of the fine silver, by the portion of silver Bullion, and you shall find 1 $\frac{1}{2}$: and thus to 1 l. weight of 7 ounces fine, you must take 1 l. $\frac{1}{2}$ of fine silver of 12 ounces fine to make the same of 10 ounces fine.

11. A Merchant hath given order unto his Factor to employ him 83 l. 6. 8 d. ster. in 5 sorts of Spices, that is to say, in Nutmegs of 80 pence the pound, Cloves at 76 pence the pound, Cinamon at 52 pence the pound, Ginger at 34 pence the pound, and Pepper at 30 pence the pound. But he hath not appointed him the quantity or portion which he should buy of every sort neither yet of al the sorts together, the question is to know how much the Factor must buy of every sort to have of each the like quantity. Answ. You must adde 80, 68, 52, 34, and 30, together, and they make 272. Then must you divide 83 l. 6 shil. 8 d. being reduced into pence, namely by 20000 pence by 272, and thereof cometh

73 l. $\frac{2}{17}$, and so many pounds must he buy of every sort of the said spices.

13. But in case he would not have so many pounds of the one sort, as he would have of the other, then you must take another middle value between the said particulars: As for example, let the meane number be 50 pence; then reduce the said 83 l. 6 shil. 8 d. into pence as the other prices are, and they do make 2000 pence, the same you must divide by 50 pence, which is the meane or common price, and thereof will come 400 pounds. And so many pounds must he have of all the sorts together. Then if you will know how many pounds he must have of every sort, you must set downe your particular prices, after the middle value, that is to say, after 50 pence, as hereafter followeth: And then worke by the Rule of Company, and you shall finde how much he shall buy of every sort.



110

110 give 400, what
- 20 ? Anſ. $72\frac{8}{11}$
- 16 ? Anſ. $58\frac{2}{11}$
- 16 ? Anſ. $58\frac{2}{11}$
- 28 ? Anſ. $101\frac{9}{11}$
- 30 ? Anſ. $109\frac{1}{11}$

400

CHAP. XIV.

Of the Rule of falſhood, or falſe Poſitions.

THe Rule of Falſhood is ſo named not for that it teacheth any deceit or falſhood, but that by fained numbers taken at all adventures, it teacheth to find out the true number that is demanded. And this (of all the vulgar rules which are in practice) is the moſt excellent: This Rule hath two parts, the one is of one falſe poſition alone; the other is of two poſitions, as hereafter ſhall appear.

Thoſe

Theſe queſtions which are done by falſe poſitions, have their opperations, in a manner like unto that of the Rule of three: but onely that in the Rule of Three, we have three numbers knowne, and here in this Rule, we have but 1 number that cometh in uſe to worke by: unto the likeneſſe whereof, we muſt deviſe two other numbers, the one multiplying, and the other dividing, as by example.

1 I have delivered to a banker, a certain ſumme of pounds in money, to have of him by the year ſimply 6 l. upon the 100 l. And at the end of 10 years, he paid me 500 pound for all, both principall and gaine. I demand how much was the principall ſumme that I delivered him at the firſt?. Here you ſée that there are divers termes: but the chiefe to worke withall is 500 l which cometh of the other numbers, that is to ſay, of 10 and 100, for of them is compoſed or made the tenor of the queſtion, the practiſe whereof is thus:

Let us faine a number at pleaſure, and with the ſame let us make our diſcourſe, even as though it were the principall ſum that we ſeek for. As by example. Suppoſe that I delivered him at the firſt 200 l. the which were worth to me in tenne

yeares

years 120 l. after the rate of 6 l. upon the 100 l. Then 120 l. added with 200 l. doe make but 320 l. and I must have 500 l. Thus you see that I have three termes of the Rule of Three: the one which shall contain the Question, the other two which I have formed artificially, which are 200 & 320: in such sort, that 320 ought to have such proportion to 200, as 500 hath unto the number that I seeke: that is to say, unto the true principall summe, then must I have recourse unto the Rule of Three, after this sort, saying: If 320 l. become of 200 l. of how much shall come 500 l. I doe multiply 500 by 200, and they are 10000 the which I must divide by 320 l. and thereof commeth 312 l. ½, which is the summ that I delivered at the first. And thus this Rule hath some congruence with the double Rule of Three.

2. I have a Cisterne with 3 unequall cocks, containing 60 pipes of water: And if the greatest cock be opened, that water will void clean in one howre, at the second it will avoid in two howers, & at the third it will require three howers: now I demand in what space it will avoid, all the cocks being set open? Answer Suppose that it will avoid in halfe an howre: that

is

as to say, in 30 minutes. Then must there avoid at the first cock the $\frac{1}{2}$, which is 30 pipes: and by the second cock the $\frac{1}{4}$, which is 15 pipes; and by the third cock the $\frac{1}{8}$, that is 10 pipes: all the which summes being added together, doe make 55 pipes: but it should be 60 pipes. Therefore say by the Rule of Three, if 55 pipes doe void in 30 minuts in how many minuts will 60 pipes void? Multiply and divide, and you shall find 32 minutes $\frac{40}{55}$, the which $\frac{40}{55}$ being subjected $\frac{8}{11}$ of a minute, and in that space will the water void, if all the cocks be set open.

Of the Rule of two False Positions.

The summe of this Rule of two false positions is thus, when any Question is proposed appertaining to this Rule, first you must imagine any number at your pleasure, which you shall name the first position, and with the same you shall worke in stead of the true number, as the question doth import: and if you see that you have missed of the true number that you doe seek then is the last number of the worke, either too great or too little; the which number, you shall note with the signe of more or lesse, for that is the first error, in the which

you

you have failed, the which signes of more, and lesse, shall be noted with these figures X, —, This figure X, betokeneth more: and this plaine line —, signifieth lesse: that is to say, the one signifieth too much, and the other too little: then you must begin again and take another number, which shall be the second position, & worke by the question as before: if you have failed again, note the excesse or want, for that is the second error. Then shall you multiply the first position by the second error crosse-wise, and again the second position by the first error (and this must alwaies be observed) and you must kæp the two products: then if the signs be both alike, that is to say, either both too much, or both too little, you shall abate the lesser product from the greater, and likewise you shall subtract the lesser error from the greater, and by the remain of those errors, you shall divide the residue of the products, the quotient shall be the true number that you seek. But if the 2 signes be unlike, that is to say, the one too much, & the other too little, then you shall adde those products together, and likewise you must adde both the errors together, and by the summe of those errors, divide the total sum of both the products: the quotient

shall

ſhall be the true number that you doe ſeek, and this is the whole Rule, as by theſe examples following, it will appeare more plaine.

Example.

3 A Man lying at the point of death ſaid, that he had in a certaine Coffer 100 Duckets, the which he bequeathed to 3 of his friends by him named, after this ſort: The firſt muſt have a certain portion: The ſecond muſt have twice ſo many as the firſt, abating 8 Duckets: And the third muſt have three times ſo many as the firſt leſſe by 15 Duckets. Now I demand how many every of them muſt have? Anſwer. Firſt, I doe imagine that the firſt man had 30 Duckets, then by the order of the queſtion, the ſecond ſhould have 52, & the third 75. Theſe three ſummes being added together do make 157, and I ſhould have but 100 ſo that this firſt error is too much by 57, then I note apart the firſt poſition 30, with his error 57 too much after this ſort 30 X 57. Therefore I preſeute my worke, & I ſuppoſe that the firſt had 24, then by the order of the queſtion, the ſecond ſhould have 40, and the third 57, theſe three ſummes being added together, doe make 121, and I muſt have but 100, ſo the ſecond error is to much

by

by 21. Therefore I note 24 X 21, under the 30 X 57, which was my first position with the error, as you may see in the Example following.

Then I multiply crosse wise, 30, (which is the first position) by 21, which is the second error, and thereof commeth 630. Likewise I multiply 24, (which is the second position) by 57, which is the first error, and I finde 1368: Then because the signes of the errors are both like, that is to say both too much, I must therefore subtract 630 from 1368 and there will remain 738 which is the dividend.

630

30 X 57

X

24 X 21.

1368. 36.
630.

738.

Again I must subtract the lesser error from the greater, that is to say, 21, out of 57, and there will remain 36, which shall be my divisor. This done I divide 738, by 36, and the quotient will be 20, $\frac{1}{2}$.

	XI
	738
$20\frac{1}{2}$,	366 (20 $\frac{1}{2}$.
33.	3
$46\frac{1}{2}$,	
100.	

The

The which 20 $\frac{1}{2}$ is the just umber of the Duckets, that the first man had for his part, so consequently the second man had 33 Duckets, and the third 46 $\frac{1}{2}$, as by the working before may appeare.

The like number will also appear in case the errors were both too little, as in making the two positions by 28 & 20, and you shall finde that the two errors will be both too little, the first will be too little by 15, and the second too little by three, as by perusing this work, you shall well perceive.

54.
18. - 15
X
20 -- 3.

300. 12
54.

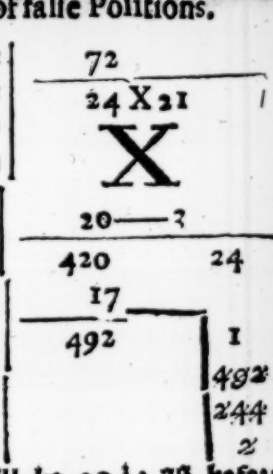
240. | x46 (20 $\frac{1}{2}$.
x22
x

Againe, if one of the errors were too much; and the other too litle, yet you shall have the true number, as before. As if the two positions were 24, and 20, you shall finde that the first error will be 21 too much, and the second will be 3 too little. Therefore multiply 24 by 3 crosse wise, cometh 72.

Likewise multiply 20 by 21, the product, will be 420. These two summes 72 and

420

420, you shall adde together, for because the signes of the errors be unlike, and they make 492, the which shall be your dividend, and again, add the lesser error 3, with the greater error 21, & they make 24 for your divisor, then divide 492 by 24, the quotient will be $20\frac{1}{2}$ as before doth plainly appeare.



And now because you shall not forget this part of the Rule, learne this briefe remembrance following.

The signs both like, Substraction doth require; and unlike signs, Addition wil desire.

The meaning whereof is thus, if both the errors have like signs, then must the Dividend and the Divisor be made by substraction as is taught before, and if those signs be unlike, then must you by Addition gather the Dividend, and the Divisor, as I have done in this last example.

Another

Another example.

4. A man hath two silver Cups of unequall weight, having to them both but one cover, the weight whereof is 5 ounc. if the cover be put to the lesser cup, it will be in double proportion unto the weight of the greater, and the cover being put to the greater cup, it will be in triple proportion unto the weight of the lesser. I demand what was the weight of every cup? Ans. Suppose that the lesser Cup did weigh 7 ounces, then with the cover it must weigh 12 ounces, and this weight should be in double proportion unto the greater, therefore the greatest must weigh but 6 ounc. adde unto it 5 ounc. for the cover, all will be, 11 ounc. but it should be 21, for to have it in triple proportion unto 7, which doth represent the weight of the lesser cup: So that this first errour is to little by 10, which you shall not after 7 in this sort, 7. —— 10.

105

7 —— 10

X

9 —— 15

99 5

105

90 15(3 ounces

15 5

After you shall suppose some other number, as 9, and make the like worke as before, so you shall finde 15 too little for the second error, which you shall put behinde 9 with the signe lesse thus — 15, and then worke with the rest as above is said, and you shall finde that the lesser Cup weighed three ounces, and consequently the greater foure ounces.

5. One man demanded of another in a morning what a clock it was? The other made him this answer, if you do adde (saith he) the $\frac{1}{4}$ of the houres which be past since midnight with the $\frac{1}{3}$ of the houres which are to come untill noone, you shall have the just houre, that is to say you shall know what a clock it was. Answ. Suppose that it was 4 a clock in the morning, so should there remaine 8, untill noone, then I take the $\frac{1}{4}$ of 4 which is 1, and the $\frac{1}{3}$ of 8 which is $5\frac{1}{3}$ and I adde them together, so I finde $6\frac{1}{3}$, & I supposed but 4, therefore this first error is too much by $2\frac{1}{3}$, which I note after my position, thus $4 \times 2\frac{1}{3}$: then againe I suppose another number, that is to say 9, so should remaine but 3 houres untill noone. I take the $\frac{1}{4}$ of 9, and the $\frac{1}{3}$ of 3, which is $1\frac{1}{2}$ and 1: these I adde together, & they make $4\frac{1}{2}$: but I supposed that it was 9, therefore

the

the second error is $4\frac{3}{4}$ too little, which I note behind my position thus: $9 - 4\frac{3}{4}$.

And then I multiply crosse-wise, as before is taught, and because the signes of the errors are unlike, that is to say, the one too much, and the other too little, therefore in this worke I must adde the products, and they will be 40. Likewise I must adde the errors and they be $7\frac{1}{12}$. Then I divide 40 by $7\frac{1}{12}$. and thereof commeth 5 houres $\frac{11}{17}$, and that houre it was in the morning.

19
$4 \times 2\frac{1}{3}$.
X
$9 - - - 4\frac{3}{4}$
21 $7\frac{1}{12}$.
19
40

Chap. 15.

Of divers Questions extraordinary, every one of them containing a generall Rule for such like Examples.

1 Five men devising of their ages: the first said to the others, that he was 120 years of age: the 2d said, if my years werr doubled then should I have so many years more than the first

man, as the first hath now more than I have: The third said in like manner if my yeares were tripled, The fourth said if my yeares were quadrupled that is to say, multiplyed by 4: The fifth said that if his yeares were quintupled, that is to say, multiplied by 5, that they should each of them have so many yeares more than the first man as he hath now more than every one of them The Question is to know, how old every one of the other 4 men were? Answ. You must take the numbers which are nearest collaterals, in naturall order unto 2, 3, 4, and 5, by reason of duplng, tripling, &c. And the greater of every of the said numbers collaterals, must be your Denominator to the lesser number. As thus, the next collaterall numbers unto 2 are 1; and 3, which is $\frac{1}{3}$. Likewise the next collaterall numbers to 3 are 2 and 4, which is $\frac{2}{4}$. And so for 4, are 3 and 5, which are $\frac{3}{5}$, and for 5 are 4, and 6 which be $\frac{4}{6}$. Then if you would know the second mans age, you must adde unto 120 the $\frac{1}{3}$ of it selfe which is 40, all is 160, the same you must divide by 2, and thereof cometh 80 yeares, and so old was the second man. And for to know the age of the third man, you must adde unto 120 his owne $\frac{1}{4}$ that is

to say, his $\frac{1}{2}$ which is 60, and they make 180. The said summe you must divide by 3, and thereof commeth 60 yeares for the third mans age. And after the same manner, you shall finde that the fourth man had 48 yeares, and the fift had 40 yeares. The proof is very easie.

2 A man having his eye-sight somwhat altered, began to tell and reckon a certain number of Birds to be in all 18. His Companion that had a clearer sight, beholding well the Birds: answered him that there were not 18 But said he, if there were twice so many more as there are, there should be as many more above 18, as there are now lesse than 18. The question is to know, how many birds there were in all? Ans. You must adde unto 18 his $\frac{1}{2}$ that is to say his $\frac{1}{2}$, & thereof will come 27, the which you shall divide by 3, and thereof cometh 9. And so many Birds there were in all.

3. A Draper hath bought 24 sorting cloaths, and he hath sold 100 pounds worth of the same cloaths, upon the which he hath gained, as much as 1 cloath did cost him. I demand what one of the said cloaths did cost him? Answ. You must adde 1 unto 24 and, they make 25. Then divide 100 by 25, and thereof will come

4 li. and so much did one cloath cost him.

4. A Maid carried Eggs unto the market, and it happened a merry Fellow to meet her, who began to jest with her in such sort, that he overthrew her basket, and brake all her egges, the Maid being much displeased with him for breaking of the same, said very earnestly unto him that he should pay for them: the Man considering with himselfe, that by his folly they were broken, answered the Maid that he would pay her for them, and therefore he demanded of her what number she had? the silly poor wench that could not well reckon, said unto him, that she could not well tell him, but said she, when I did put them into my Basket by 2 and by 2, there remained 1 Egge: and when I counted them by 3 and by 3, and there remained 1: and I did reckon them by 4 and by 4 there remained still 1: but when I did count them by 5 and by 5, there remained none. The question is to know how many Egges the Maid had in all? Answ. For to doe this, and all such like questions, you must multiply 2, 3, and 4, together; saying 2 times 3 make 6, and 6 times 4 make 24, unto this number you must adde 1, they make 25. And so many Egges she had in all. But if

she had had a greater number of Eggs that she might have counted them till she came to 7 & 7, after the same manner as she did, till she came to 5 and 5, you must multiply these numbers 2,3,4,5, and 6, the one by the other, and thereof will come 720, unto the which adde 1, and they make 721. And so many Eggs she should have had, if she had counted them by 7 and 7.

5. Againe, if she had said, that when she counted her Eggs by 2, and by 2 there remained 1, and by 3 and 3, there remained 2, and by 4 and 4, there remaineth 3, and by 5 and 5, there remained nothing. The Question is to know, how many Egges she should have had? Answ. You must finde a number the least that you can possible, which may be divided by 2, by 3, and by 4, that is to say 12 is the nearest number, divide the same by 5, and there remaineth 2. This being done you must finde two numbers, the least that is possible, which may be divided by 5, and by 2, in such sort that the number which is divided by 2 may exceed (the other that is divided by 5) onely by 1, and those 2 numbers are 10, and 6, for if you divide 6 by 2, your quotient will be 3, and 10 divided by 5, bringeth but 2:

then consider, that 6 containeth 3 times 2, and therefore you must multiply 12 by 3, and they make 36, from the which you must subtract 1, and there will remaine 35, which is the number that is required to be found.

6. And if she had counted them after the same manner unto 7, and that there had remained nothing: then you know that 60 is the nearest number that may be divided by 2, 3, 4, 5, and 6, the which 60 being divided by 7, there will remaine 4, & therefore you must find 2 numbers the least that may be, that can be divided by 4, & by 7, in such sort, that that number which is divided by 4, may exceed the other number (by 1) that is divided by 7, the which 2 numbers are 7, and 8, for if you divide 8 by 4, your quotient will be 2. And dividing 7 by 7, your quotient will be 1, and therefore for because that containeth 2 times 4, you must multiply 60 by 2, and thereof cometh 120, from the which number you shall subtract 1 and the residue which are 119, is the number that is required.

7. A Thiefe entring into a Garden, did steale from thence a certaine number of Apples: And at his comming forth, he did meet with three men, one after another

another, who threatned to accuse him: and for to appease them, he gave unto the first the $\frac{1}{3}$ of all his Apples, who received the same with thanks, but he returned him 12 of them back again. Then he gave unto the second the $\frac{1}{3}$ of them that he had remaining, who received the same, but he gave him back again 7 Apples: & so he gave unto the third man, the $\frac{1}{2}$ of the residue, who returned him 4. And in the end he had still remaining 20 Apples, The question is to know, how many Apples he gathered in the said Garden? Answ. For to doe this, you shall substract 4 from 20, and there will remaine 16, the same you shall double, and they make 32: from the which you must abate 7, and there will remain 25: the same you shall double, and they make 50: from the which you shall substract 12, and there will remaine 38, wherof the double which is 76, doth shew the number of Apples that he gathered. This and such like questions are easie to be done in going backwards from the end of the question untill you come to the beginning thereof. But if he had given the $\frac{1}{3}$ unto one of them, the $\frac{1}{2}$ unto another, and $\frac{1}{4}$ unto the last, or any other, all the same may be done by the Converse Rule, that is to say,

begin-

beginning at the end of the Question, till you come to the beginning as before is said.

8. A Merchant did ride unto three severall Faires: at the first he doubled his money and spent 10 Crowns: at the second Faire he did also double his money and spent 10 Crownes: And likewise at the third Faire, he did double his money and spent 10 Crowns, and in the end, he found that he had remaining but 2 Crownes. the Question is to know, how many Crowns he had at the first? Answ. For to do this, you must adde unto 10 Crowns, the 2 Crowns which he had remaining, and they make 12, whereof you shall take the $\frac{1}{2}$ which is 6: againe adde 6 unto 10, & they make 16: whereof you shall take the $\frac{1}{2}$ which is 8: Finally, you shall adde 8 unto 10, & they make 18, whereof you must take the $\frac{1}{2}$ which is 9: & so he had 9 Crowns at the first.

9. A Burgesse would distribute a certains summe of Pence unto divers poore men equally: but after that he had counted how many there were in number, he perceived that if he should give unto every man 6 d. he should want 14 d. But if he should give every man 5 d. the peice, he should have 9 d.

9 d. remaining. The question is to know the number of the poore men. Answ. For to doe this, and such like questions, you must have in remembrance this principall, more from more or lesse from lesse, &c. which is set out in two Verses in the Rule of false positions, that is to say, you must adde the lesse with the more; Namely, 14 with 9. and they make 23: and divide the same sum by the difference which is of 5 from 6 that is 1 and therefore you must divide 23 by 1, but 1 doth neither multiply nor divide, therefore you may conclude, and say that there were 23 poore men.

10. And if he should give to every man 5 pence, he should have 19 pence remaining, and giving every man 7 d. he should have 3 pence over: In this case you must abate more from more, that is to say, 3 from 19 and the rest which is 16, you must divide by 2 which is the difference of 5 from 7: and the quotient which is 8, doth shew you the number of the poor men: and likewise if that he had had both wants, that is, if both the numbers had been too little, you must have done with them as you did with the others that were both more.

11. A Man hath given unto 20 Workfolks 20 shillings, that is to say, unto men, women,

women, and boys: unto men he gave 20 d. a peece, unto women 15 d. and unto boys he gave 8 d. The question is to know how many men, how many women, and how many boys there were in all? Answ. First you must take the difference of 8 from 15, and also from 20: and you shall have 7 for the difference of the women, and 12 for that of the man: this done, you may suppose that there were 20 boys, the which at 8 d. the peece maketh 160: the which you must abate from 20 shil. being reduced into pence, that is, from 240 pence, and there will remaine 80 pence, the which 80 you shall divide into 2 such parts that the one may be divided by 7, and the other by 12, and that nothing may remaine after the divisions are made. The which 2 numbers are 56, and 24: For 56 being divided by 7, bringeth into the quotient 8, and 24 being divided by 12, will bring into the quotient 2: which sheweth that there was 8 women, 2 men, and the rest of the 20, which are 10 were boys, so there were 8 women, 2 men, and 10 boys. Some men doe call this Rule, the Virgins Rule.

Chap.

Caap. 16.

Of Sports and Paſtime, done by Number.

If you would know that number that any man doth think, or imagine in his minde as though you could diuine: Bid him triple the ſame number, then of the product let him take the $\frac{1}{2}$, if the number be euen, or elſe the greater halfe, if the ſame be odde, then bid him triple againe the ſaid $\frac{1}{2}$: after ſay to him, that he ſhall put away if he can 36, 27, or 9, from the laſt number being tripled: that is to ſay, cauſe him ſubtilly to put away 9, as many times as is poſible, and kæp the number ſecretly: and when he can no more take away 9: then to know if that yet there remaine any number, bid him abate 3, 2, or 1 if he can: this done, ſæ how many times 9 you haue cauſed him to abate, for the which kæp you in minde ſo many times 2, and if that you know that he had any thing remaining beſides the nines, the ſame ſhall note unto you 1.

Example.

Example.

Suppose that he thought 6, which being tripled is 18, whereof the $\frac{1}{3}$ is 9, the triple of that is 27: now cause him to abate 18, or 9, or 27: and agayne 9 but then he will say unto you that he cannot; bid him then abate 3, or 2, or 1, he will say also that he cannot; wherefore considering that you have made him to abate 3 times 9 justly, you shall tell him that he thought 6, for 3 times 2 maketh 6. If he had thought 5, the triple thereof is 15, whereof the greater $\frac{1}{3}$ is 8, the triple of that maketh 24, which containeth 2 times 9, they are worth 4 and the remaine signifieth 1, the which added together make 5, which is the number that, he thought.

2. If in any company, one of them hath a Ring upon his finger, & you would know by manner of divining who hath the same, and upon what finger and what joynt: cause the persons to sit down in order, and keep likewise an order of 3 fingers: then separate your selfe from them in some certain place, and say unto one of the lookers on, that he double the number (marking well in your minde the order) of him that hath the Ring: and unto the double bid him adde 5, and then cause him to multiply this

this addition by 5, and unto the product bid him adde the number of the finger of the person which hath the Ring: Suppose that the same last sum did amount to 89, then afterward say to him, that he put after the same last number toward his right hand, a figure signifying upon which of the joynts he hath the Ring, as if it be upon the third joynt, let him put 3 after 89, and it will be 893, this done, you shall aske him what number he keepeth, from the which you shall abate 250, & you shall have 3 figures remaining at the least. The first toward your left hand shall signifie the number of the person which hath the Ring. The second or middle figure shall represent the number of the finger. And the last figure toward your right hand, shall betoken the number of the joynt. As if the number which he did keepe were 883, from that you shall abate 250, & there will remaine 643, which do note unto you, that the first person hath the Ring upon the 4 finger, and upon his third joynt.

But note, that when you have made your substraction, if there doe remaine a Cipher in the place of Tens, that is to say, in the second place, you must then abate 1 from that figure which is in the

place

place of hundreds, that is to say, from the figure which is next your left hand, and that shall be worth 10 tenths, signifying the tenth finger: as if there should remain 703, you must say, that the first person (upon his tenth finger, and upon his third joynt) hath the King.

3. And after the same manner, if a man doe cast three Dice, you may know the points of every one of them, for if you doe cause him to double the points of one Dye, and unto the double to adde 5, and the same summe to multiply by 5, and unto the product adde the points of one of the other Dice, and behind that number toward the right hand, to put the figure which signifieth the points of the last Dye, and then shall you ask him what number he keepeth, from the which abate 250, and there will remain 3 figures: which do note unto you the points of every Dye.

4. Likewise, if 3 of your Companions, to say, Peter, James, & John, would (in your absence) give themselves every one a contrary name? as for example: Peter would be called a King, James a Duke, & John a County: And you would divine which of them is called a King, which the Duke, & which the County: take 24 stones, or other

pieces

pieces whatsoever and give unto Peter 1. unto James 2, and unto John 3, or otherwise. But mark well unto which of them you have given 1, unto which 2, and unto whom 3. Then leaving the 18 stones (before them) that are remaining, you shall absent your self from their sight, or else turne your face from them, saying thus unto them: whosoever nameth himself a King, for every stone that I gave him, let him take 8 of the residue; and he that nameth himselfe a Duke, for every stone that I gave him, let him take 2 of them that remain; and he that calleth himself a County, for every stone that I gave him, let him take 4: this being done, approach near them, and mark how many stones are remaining: and know this, that there cannot remain any other number, but one of the six, 1, 2, 3, 5, 6, 7, for the which six numbers we have chosen to every of them a severall name which are these Angeli, Beati, Talier, Messias, Israel, Pietas: each of them conteining 3 vowels a, e, i, which do shew the names by order: That is to say, the vowell a

sheweth which is the King; the vowell e, telleth which is the Duke; and the vowell i, sheweth which is the County: in following the order how, and to whom you have given 1 stone, to whom 2, and to which 3, then if there do remain but 1 stone, the first name *Angeli*, (by these 3 vowels a, e, i,) sheweth that Peter is King, James the Duke, and John the County. And if there do remain 2 stones. the second name Beati, shall shew you by these 3 vowels, a, e, i, that Peter is the Duke, James the King, and John the County. And so of the other, as by this Table doth plainly appeare.

1,	2,	1,	2,	3,	3,
2,	1,	3,	3,	1,	2,
3,	3,	2,	1,	2,	1,
a,	e,	a,	e,	i,	i,
e,	a,	i,	i,	a,	e,
i,	i,	e,	a,	e,	a
1,	2,	3,	5,	6,	7,
A.	B,	T,	M,	I,	P,

FINIS.

IN the ensuing Tables, the figures towards the left hand of the line do shew the number of Ells, Aulns, Vares, Braces or Paulms, which are equal to the 100 Ells, Aulns, Vares, Braces, or Paulms of the place named over the head of the Table: and the figures to the right hand of the line do shew the fractionary part, and so are all numerators of fractions, whose common denominator is 1000. So that in this decimal way of accompt 750 is 3 quarters of an Ell, Aulne, Vare, &c. 500 is halfe an Ell, 250 is a quarter, and 175 is half a quarter, &c.

Example; at Lions the 100 Aulnes makes at Antwerp 163 Ells, and 934 parts of an Ell divided into 1000 parts, substract from 934, 750, which is 3 quarters, and the remaine 184 which is lesse then a quarter, therefore take from it 175 which is half a quarter, and there remains 009 as much as nothing: therefore the 100 Aulns at Lions makes at Antwerp 163 Ells 3 quarters, and halfe quarter, the like for any other.

As in the ensuing Tables the Ell is divided into 1000, so the pound is divided into the like parts, and therefore 750 in the fraction is 3 quarters of a pound or 12 ounces, 500 is half a pound or 8 ounces, 250 is a quarter or 4 ounces, and 175 is half a quarter or 2 ounces: But the way to value these equall fractions into ounces is by multiplying the numerator of the fraction by 16, and cut off 3 figures to the right hand, that which remains to the left hand is ounc. Example, 100 l. of Lions makes at Antwerp 90 l. 823 parts of a li. which 823 multiplyed by 16 the product is 13. 168, from which cut off three figures to the right hand; there remains 13 ounces: Or seek the number 823 (or the nearest to it, lesse it cannot be found) and against it to the right hand you shall find 13 ounces as before, and the like of any other number.

15	937.5
14	875.0
13	812.5
12	750.0
11	687.5
10	625.0
9	562.5
8	500.0
7	437.5
6	375.0
5	312.5
4	250.0
3	187.5
2	125.0
1	62.5

100 Ells at London do make

The

The Agreement of the Measures and VVeights of divers Countries, the one with the other, being reduced to an equality, and drawn into Tables, as followeth.

London.

100 Ells at London do make at

Antwerp,	166	667	Ells.
Nuremberg,	174	167	
Franckford,	208	333	
Dantzick,	138	333	
Vienna,	145	000	
Arras,	165		000
Lions,	101	667	Aulnes.
Paris,	95	000	
Roan,	86	667	
Sivill,	135	000	Vares.
The Iles of Mayores,	103	333	
Venice,	108	000	Braces.
Lucques,	200	000	
Florence	204	167	
Millan,	230	000	
Genoa,	480	833	Paulms.

The Vares of Lishborn is equal to the Ell of London.

Antwerp.

100 Ells at Antwerp do make at

London,	60	Ells
Nuremberg,	104	500
Frankford,	125	000
Dantzick,	83	000
Vienna,	87	200
Arras,	99	000
Lions,	61	Aulnes.
Paris	57	000
Roan,	52	
Sivill,	81	Vares.
The Iles,	62	
Venice,	108	Braces.
Lucques,	120	
Florence	122	5
Millan,	138	
Genoa,	288	5 Paulmes.

Nuremberg.

Nuremberg.

100 Ells at Nremberg do make at

London,	57	416	Ells
Antwerp,	95	694	
Franckford,	119	617	
Dantzick	79	414	
Vienna,	83	253	
Arras,	94	736	
Lions,	58	373	Aulns.
Paris,	54	545	
Roan,	49	760	
Sivill,	77	506	Vares,
The Iles,	59	330	
Venice,	103	292	Braces.
Lucques,	114	832	
Florence,	117	225	
Millan,	132	057	
Genoa.	276	076	Paulms.

Franckford.

100 Ells at Frankford do make at

London,	48	000	Ells.
Antwerp,	80	000	
Nuremberg,	83	648	
Dantzick,	64	400	
Vienna,	69	600	
Arras,	79	200	
Lions,	48	8	Aulns.
Paris,	45	600	
Roan,	41	600	
Sivill,	64	8	Vares.
The Iles,	40	600	
Venice.	86	4	Braces.
Lucques,	96	000	
Florence,	98	000	
Millan,	110	440	
Genoa,	239	8	Paulms.

The Ell at Leibzick and Preslau is equall unto the Ell at Franford.

Dantzick.

Dantzick.

100 Ells at Dantzick do make at

London,	72	289	Ells
Antwerp,	120	482	
Nuremberg,	125	903	
Franckford,	150	602	
Vienna,	104	819	
Arras,	112	048	
Lions,	73	494	Aulns.
Paris,	68	602	
Roan,	62	650	
Stvill,	97	590	Vares.
The Iles	74	699	
Venice,	130	120	Braces.
Lucques,	144	578	
Florence,	147	590	
Millan,	166	265	
Genoa,	347	590	Paulms.

Vienna.

100 Ells at Vienna do make at

London,	68	965	Ells
Antwerp,	114	942	
Nuremberg,	120	114	
Franckford,	143	678	
Dantzick,	95	402	
Arras,	113	793	
Lions,	70	011	Aulnes.
Paris,	65	517	
Roan,	59	765	
Sivill,	93	103	Vares.
The Iles,	71	264	
Venice,	124	138	Braces
Lucques,	137	930	
Florence,	140	108	
Pillan,	158	620	
Genoa,	331	601	Paulms.

Arras.

Arras.

100 Ells at Arras do make at

London,	60	606	Ells.
Antwerp,	101	010	
Nuremberg,	155	555	
Franckford,	126	262	
Dantzick,	83	838	
Vienna,	87	878	
Lions,	61	616	Aulnes.
Paris,	57	575	
Roan,	52	525	
Stvill,	80	180	Vares.
The Iles,	62	626	
Venice,	109	090	Brazes.
Lucques,	121	212	
Florence,	123	131	
Millan,	139	394	
Genoa,	291	414	Paulms.

Lions

Lions.

100 Ankres at Lions do make at				
London,	98	362	Ells	
Antwerp,	163	934		
Nuremberg.	171	311		
Franckford,	204	918		
Dantzick,	136	065		
Vienna,	142	623		
Arras,	162	295		
Paris,	93	443	Aulns.	
Roan,	85	246		
Sivill,	132	791	Vares.	
The Iles,	101	640		
Venice,	177	049	Braces.	
Lucques,	196	721		
Florence.	200	819		
Milan,	226	229		
Genoa.	472	950	Paulms.	

The

The agreement of measures at Arras with the measures at other places.

Paris.

100 Aulns at Paris do make at

London,	105	263	Ells.
Antwerp,	175	439	
Nuremberg,	183	333	
Franckford,	219	298	
Dantzick,	145	615	
Vienna,	152	630	
Arras,	173	984	
Lions,	107	000	Aulns.
Roan,	91	228	
Stvill,	142	105	Vares.
The Iles,	108	793	
Venice,	189	474	Braces.
Lucques,	210	526	
Florence,	214	911	
Millan	242	105	
Genoa,	506	136	Paulms

Roan.

Roan.

100 Aulnes at Roan do make at

London,	115	384	Ells.
Antwerp,	192	307	
Nuremberg,	200	961	
Franckford,	240	384	
Dantzick,	159	615	
Vienna,	167	307	
Arras,	190	384	
Lions,	117	307	Aulnes.
Paris,	109	615	
Sivill,	155	769	Vares.
The Iles,	119	230	
Venice,	207	592	Braces.
Lucques,	230	768	
Florence	235	565	
Millan.	265	384	
Genoa,	554	807	Paulms.

Sivill.

100 Vares at Sivill do makes at

London,	74	074	Ells.
Antwerp,	123	457	
Nuremberg,	129	012	
Frankford,	154	321	
Dantzick,	102	469	
Vienna,	107	407	
Arras,	122	222	
Lions,	75	308	Aules.
Paris,	70	370	
Roan,	64	197	
The Iles,	76	543	Vares.
Venice,	133	333	Braces.
Lucques,	148	148	
Florences,	151	234	
Pillan,	170	370	
Genoa,	356	174	Paulms.

The

The Iles of Madere.

100 Mares at the Ile of Madere do make at

London,	96	772	Ells.
Antwerp,	161	290	
Nuremberg,	168	548	
Franckford	201	613	
Dantzick	133	871	
Vienna,	140	322	
Arras,	159	677	
Lions,	98	387	Aulnes.
Paris.	91	935	
Roan,	83	871	
Sivill,	130	645	Vares.
Venice,	174	226	Braces.
Lucques,	193	448	
Florence,	197	903	
Millan,	222	583	
Genoa.	465	226	Paulms.

Venice.

100 Braces at Venice do make at

London,	55	555	Ells.
Antwerp,	92	542	
Nurembuerg,	96	790	
Franckford,	115	741	
Dantzick,	76	853	
Vienna,	80	055	
Arras,	91	696	
Lions,	56	481	Aulnes.
Paris,	52	777	
Roan,	48	148	
Sivill	75	000	Vares.
The Iles,	57	407	
Lucques,	111	111	Braces.
Florence,	113	426	
Millan,	127	777	
Genoa,	266	018	Paulms.

Lucques

100 Braces at Lucques make at			
London,	50		Ells.
Antwerp,	63	333	
Nuremberg,	87	083	
Franckford,	104	166	
Dantzick,	69	166	
Vienna,	72	500	
Arras,	82	500	
Lions,	50	833	Aulns.
Paris,	47	500	
Roan,	43	333	
Sivill,	67	500	Vares.
The Iles,	51	666	
Venice.	90	000	Braces.
Florence,	102	083	
Millan,	115	000	
Genoa,	240	416	Palms

100 Braces at Florence to make at

Florence.

Florence.

100 Braces at Florence to make at

London,	48	979	Ells.
Antwerp,	81	632	
Nuremberg,	85	306	
Frankford	102	040	
Dantzick	67	755	
Vienna,	71	020	
Arras,	80	808	
Lions,	49	796	Aulnes.
Paris.	46	530	
Roan,	42	449	
Stvill,	66	122	Vares.
The Iles,	50	612	
Venice,	88	163	Braces.
Lucques,	97	959	
Millan,	112	653	
Genoa,	235	510	Paulms.

Millan.

100 Waces at Millan do make at				
London,	43	478	Ells.	
Antwerp,	72	463		
Nuremberg,	75	724		
Frankford,	90	579		
Dantzick,	60	145		
Vienna,	63	043		
Arras,	70	174		
Lions,	44	202	Aulnes.	
Paris,	41	217		
Roan,	37	680		
Civill,	58	695	Vares,	
The Iles.	44	926		
Venice,	78	260	Braces.	
Lucques,	86	956		
Florence	88	768		
Genoa,	209	058	Paums.	

The Agreement of Weights of divers Countries, the one with the other being reduced to an equallity, and drawn into Tables as followeth.

London.

12 pounds weight at London do make at	Antwerp,	107	625
	Lisbone,	99	000
	Nuremberg.	100	500
	Roan,	98	000
	Lions,	118	500
	Paris,	102	250
	Diep,	100	250
	Geneva,	90	375
	Toulouse,	122	750
	Rochell,	124	875
	Marseilles,	124	250
	Sivill,	109	750
	Venice sut.	166	875
	Venice grot.	105	375
	Vienna,	89	375
	Prestaw,	134	625
	Leibzick,	101	250
	Dantzick,	129	250
	Lubeck,	97	375
	Barcellone,	148	500
	Genoa.	157	250

Antwerp.

100 lib. at Antwerp makes at	London,	104	065
	Lisbone,	91	986
	Nuremberg,	93	371
	Roan,	91	057
	Lions,	110	104
	Paris,	94	006
	Diep,	93	147
	Geneva,	83	972
	Toulouse,	114	053
	Rochell,	116	028
	Marsellles,	115	447
	Sibill,	101	974
	Venice lut.	155	052
	Venice grol.	97	909
	Vienna,	83	043
	Presław,	125	087
	Leibzick,	94	076
	Dantzick,	120	093
	Lubeck,	90	476
	Barcellone,	133	333
	Genoa.	146	109

Franckford

Franckford.

	London,	113	131
	Antwerp,	108	713
	Nuremberg,	101	262
	Roan,	98	989
	Lions,	119	696
	Paris,	103	282
	Diep,	101	265
	Geneva,	91	288
	Toulouse,	123	998
	Rochell,	126	136
100 lib. at Lisbonne makes at	Marseilles,	125	505
	Sivill,	110	858
	Venice sut.	168	561
	Venice gros.	106	439
	Vienna,	90	277
	Breslaw,	135	985
	Leibzick,	102	272
	Dantzick,	130	555
	Lubeck,	98	358
	Barcellone,	144	949
	Genoa,	158	838

The 100 weight at *Franckford* is equall unto the 100 weight at *Lisbborne*.

Nuremberg.

London,	111	442
Antwerp,	107	089
Lisbone,	98	508
Roan,	97	512
Lions,	117	910
Paris,	101	711
Diep,	99	751
Geneva,	89	927
Toulouse,	122	139
Rochell,	124	254
Marseilles,	123	632
Sivill,	109	204
Venice sut.	166	445
Venice grof.	104	850
Vienna,	88	930
Wreslaw,	133	955
Leibzick,	100	746
Dantzick,	128	607
Lubeck,	96	890
Barcellone,	142	786
Genoa,	156	467

100 lib. at Nuremberg makes at

Roan.

Roan.

100 lib. at Roan makes at	London,	114	285
	Antwerp,	109	821
	Lisbonne.	101	020
	Nuremberg,	102	551
	Lions,	120	918
	Paris,	104	336
	Diep,	102	296
	Geneva,	92	219
	Toulouse,	125	255
	Rochell,	127	423
	Marseilles,	126	796
	Sivill,	111	990
	Venice sut.	117	708
	Venice grot.	170	525
	Vienna,	91	199
	Breslaw,	137	347
	Leibzick,	103	316
	Dantzick,	131	898
	Lubeck,	99	362
	Barcellone,	146	530
	Genoa,	160	459

Lions.

100 lib. at Lions makes at

London,	95	063
Antwerp,	90	823
Lisbone,	83	544
Nuremberg,	84	810
Roan,	82	700
Paris,	86	287
Diep,	84	599
Geneva,	76	265
Toulouse,	103	589
Rochell,	105	389
Marseilles,	104	850
Sivill,	92	616
Venice sut.	140	823
Venice grof.	88	928
Vienna,	75	422
Breslaw,	113	607
Lesbzick,	85	443
Dantzick,	109	072
Lubeck,	82	173
Barcellone,	121	097
Genoa,	132	700

Paris.

100 lib. at Paris makes at	London,	109	535
	Antwerp,	105	256
	Lisbone,	96	821
	Nuremberg,	98	329
	Roan,	95	843
	Lions,	115	892
	Diep,	98	044
	Geneva,	88	386
	Toulouse,	120	049
	Rochell,	122	146
	Marseilles,	121	515
	Sivill,	107	334
	Venice sut.	163	203
	Venice gros.	103	056
	Vienna,	87	408
	Breslaw,	131	663
	Leibzick,	99	022
	Dantzick,	126	406
	Lubeck,	95	232
	Barcellone,	140	342
	Genoa,	153	789

The 100 weight at *Collen* and *Amburge*, is equall to the 100 weight at *Paris*.

Diep.

100 lib. at Diep makes at

London,	111	720
Antwerp,	107	357
Lisbone,	98	753
Nuremberg,	100	249
Roan,	97	755
Lions,	118	204
Paris,	101	995
Geneta,	90	149
Tholouse,	122	443
Rochell,	124	563
Marseilles,	123	940
Sibill,	109	476
Venice sut.	166	458
Venice grof.	105	112
Vienna,	89	152
Prestaw,	134	288
Leibzick,	100	697
Dantzick,	128	027
Lubeck,	97	132
Barcellone,	143	042
Genoa,	156	857

Geneva.

100 lib. at Geneva make at

London,	123	928
Antwerp,	119	087
Liſbone,	109	543
Nurmberg,	111	092
Roan,	108	437
Lions,	131	123
Paris,	113	138
Diep,	110	926
Toulouſe,	135	823
Rochell,	138	174
Marſeilles,	137	482
Sivill,	121	438
Ventre ſut.	184	637
Venice groſ.	216	597
Vienna,	98	893
Preſlaw,	148	962
Leibzick,	112	028
Dantzick,	143	015
Lubeck,	107	745
Bacellone,	158	782
Genoa,	173	997

Toulouſe.

Toulouſe.

100 lib. at Toulouſe makes at

London	91	254
Antwerp,	87	678
Franckford	80	651
Nuremberg,	81	875
Roan,	79	878
Lions,	96	537
Paris,	83	299
Diep,	81	670
Geneva,	73	625
Rochel',	101	730
Marſeilles,	101	220
Sivill,	89	409
Venice ſut.	135	947
Venice groſ.	85	845
Vienna,	72	810
Preſlaw,	109	674
Leibzick,	82	484
Dantzick,	105	295
Lubeck,	79	022
Barcellons,	116	904
Genoa,	128	106

Rochell.

Rochell.

100 pound at Rochell. make at

London,	89	689
Antwerp,	86	187
Lisbone,	79	279
Nuremberg,	80	480
Roan,	78	478
Lions,	94	895
Paris,	81	882
Diep,	80	280
Geneva,	72	373
Toulouse,	98	298
Marseilles,	99	499
Stoill,	87	888
Venice sut.	133	638
Venice gros.	84	380
Vienna,	71	571
Prestaw,	07	807
Leibzick	181	081
Dantzick,	103	503
Lubeck,	77	978
Barcellone,	114	914
Genoa,	125	925

Marſeilles.

100 lib. at Marſeilles makes at	London,	90	148
	Antwerp,	86	627
	Liſhborne,	79	678
	Nuremberg,	80	885
	Roan,	78	873
	Lions,	95	372
	Paris,	82	293
	Diep,	80	684
	Geneva,	78	068
	Toulouſe	98	712
	Rochell,	100	502
	Sivill,	88	322
	Uence ſut.	134	306
	Uentre grot.	84	809
	Uienna,	71	931
	Przellaw,	108	350
	Lefbzick,	81	489
	Dantzick,	104	024
	Lubeck,	78	370
	Barcellone,	115	493
	Genoa,	126	558

Sivill

	London,	102	050
	Antwerp,	98	063
	Lisbone,	90	205
	Nuremberg,	91	571
	Roan,	89	202
	Lions,	107	972
	Paris,	93	166
	Diep,	91	161
	Geneva,	82	346
	Toulouse,	111	845
100 lib. at Sivill make at	Rochell,	113	781
	Marsellis,	113	212
	Venice sut.	152	050
	Venice gros.	96	014
	Vienna,	81	435
	Wreslaw,	122	665
	Leibzick,	92	255
	Dantzick,	117	767
	Lubeck,	88	724
	Bacellone,	130	751
	Genoa,	143	325

Venice ſuttle Weight.

100 lib. at Venice ſuttle weight makes at

London,	67	115
Antwerp,	64	494
Iſhhowe,	59	325
Nuremberg,	60	224
Roan,	58	726
Lions,	71	011
Paris,	61	274
Diep,	60	074
Geneva,	54	157
Toulouſe	73	558
Rochell,	74	831
Marſeilles,	74	457
Sibill,	65	768
Venice groſs.	63	146
Vienna,	53	558
Breſlaw,	80	674
Lipzick,	60	674
Dantzick,	77	453
Lubeck,	52	299
Barcelone,	85	992
Genoa,	94	232

Venice grosse Weight.

100 lib. at Venice grosse weight makes at	London,	106	287
	Antwerp,	102	135
	Lisbone;	93	950
	Nuremberg,	95	373
	Loan,	93	001
	Lions,	112	467
	Paris,	97	034
	Diep,	95	136
	Geneva,	85	765
	Toulouse,	116	489
	Rochell,	118	505
	Carlestiles,	117	912
	Sivill,	104	151
	Venice sut.	158	363
	Vienna,	84	816
	Breslaw,	127	758
	Delbzig,	96	087
	Damzick,	122	742
	Lubeck,	92	408
	Barcelone,	126	275
	Genoa,	149	229

Vienna.

100 lib. at Vienna makes at	London	125	315
	Antwerp,	120	420
	Lishborne,	110	769
	Nuremberg,	112	447
	Roan,	109	650
	Lions,	132	598
	Paris,	114	405
	Diep,	112	168
	Geneva,	101	118
	Toulouse,	137	343
	Rochell,	139	720
	Marsellis,	139	021
	Sivill,	122	797
	Venice sut.	186	712
	Venice grof.	117	902
	Preslaw,	150	629
	Leibzick,	113	286
	Dantzick,	144	615
	Lubeck,	108	951
	Barcelone,	160	55
	Genoa,	175	941

Preslaw.

100 pound at Preslaw make at

London,	83	195
Antwerp,	79	944
Lisbborne,	73	537
Nuremberge,	74	652
Roan,	72	795
Lions,	88	022
Paris,	95	951
Diep,	74	466
Geneva,	67	131
Tolouse,	91	179
Rochell,	92	757
Marsellis,	92	220
Sivill,	81	522
Venice sut.	123	955
Venice grot.	78	273
Vienna,	66	387
Leibzick,	75	009
Dantzick	96	087
Lubeck,	72	330
Barcellone,	106	592
Genoa,	116	805

Leibzick.

100 pound at Leibzic makes at

London,	110	617
Antwerp,	106	296
Lisbone,	97	788
Nuremberg,	99	259
Roan,	96	790
Lions,	116	938
Paris,	100	987
Diep,	99	012
Geneva,	89	259
Toulouse,	121	234
Rochell,	123	333
Marselles,	122	716
Sivill,	108	395
Venice sub,	164	814
Venice grof	104	074
Vienna,	88	272
Pzeslaw,	132	963
Dantzirk,	127	654
Lubeck,	96	172
Barcelone,	141	827
Genoa.	155	130

Dantzick

Dantzick.

100 lib. at Dantzick makes at

London,	86	653
Antwerp,	83	268
Lisbone,	76	595
Naremberg,	77	756
Roan,	75	822
Lions,	91	683
Paris,	79	110
Diep,	77	563
Geneva,	69	922
Toulouse,	94	671
Rochell,	96	615
Marseilles,	96	131
Sivill,	84	913
Venice sul.	129	110
Venice grot.	81	520
Vienna,	69	148
Przeslaw,	104	158
Reibzick,	78	336
Lubeck,	75	337
Barcellone,	111	025
Genoa.	121	663

Lubeck.

100 lib. at Lubeck makes a	London,	115	019
	Antwerp,	110	526
	Lisbone,	101	667
	Nuremberg,	103	209
	Roan,	100	642
	Lions,	121	694
	Paris,	105	006
	Diep,	102	952
	Geneva,	92	811
	Toulouse,	126	059
	Rochell,	128	241
	Marselles,	127	609
	Sibill,	112	708
	Venice sut.	171	373
	Venice grol.	108	215
	Vienna,	91	784
	Prestaw,	138	254
	Leibzig,	103	979
	Dantzig,	132	734
	Barcellone,	147	368
	Genoa.	161	489

Barcellone.

100 lib. at Barcellone, makes at

London,	78	048
Antwerp,	75	000
Lisbone,	68	989
Nuremberg,	70	061
Roan,	68	290
Lions,	82	578
Paris,	71	254
Diep,	69	860
Geneva,	62	979
Toulouse,	85	540
Rochell,	87	021
Marseilles,	86	585
Sivill,	76	480
Venice sut.	116	149
Venice gros.	73	432
Vienna,	62	282
Pzeslaw,	93	118
Leibzick,	70	557
Dantzick,	90	061
Lubeck,	67	857
Genoa,	109	581

Genoa.

100 lib. at Geneva makes at	London,	71	224
	Antwerp,	68	442
	Lisbone,	62	957
	Nuremberg,	63	910
	Roan,	62	320
	Lions,	75	357
	Paris,	65	023
	Diep,	63	752
	Geneva,	57	478
	Toulouse,	78	060
	Rochell,	79	411
	Marsellies,	79	014
	Sivill,	69	793
	Venice sut.	106	121
	Venice grof.	67	011
	Vienna,	56	836
	Presslaw,	85	612
	Leibzick,	64	388
	Dantzick,	82	194
	Lubeck,	61	923
	Barcellone,	91	272

The 100 vveight at *Aquila* is equall to the 100 vveight at *Genoa*.

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FINIS.

An Advertiſement touching this Edition.

THE friendly Reader may pleaſe to take notice that in this Impreſſion of 1646. the whole Booke hath been reviſed, every Queſtion therein examined, the Faults that were committed in former Impreſſions Corrected, the whole reſtored to its firſt integrity. The Tables of Weights and Meaſures at the end of the Booke according to the Authors Suppoſition, that is, as they are all compared with the Weights and Meaſures of *London*, with much labour examined: The Fractions which before were in the common way (and ſo the figure being ſmall in many not diſcerned) are put into the decimall parts, and ſo the ſame with the integrall, but farre more true than the common Fractions can expreſſe it in one figure, and if in the common it be expreſt in many (as it muſt be if true) then the decimall is far more eaſie, becauſe the Denominator is one and the ſame to all, whereas the other is differing.

I ſhall not need to adde any thing in praiſe of the Book, the many Impreſſions that have been made thereof may ſave me that labour; the taske I under tooke was to Correct what was amiſſe, which I have done with all faithfulneſſe, and ſo commend it to thy friendly acceptance. Farewell.

THE